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Sir John F. W. Herschel, Bart.

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by the

English Agricultural Society.

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ROYAL AGRICULTURAL SOCIETY

OF ENGLAND.

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These experiments, it is true, are not easy; still they are in the power of every thinking husbandman. He who accomplishes but one, of however limited application, and takes care to report it faithfully, advances the science, and, consequently, the practice of agriculture, and acquires thereby a right to the gratitude of his fellows, and of those who come after. To make many such, is beyond the power of most individuals, and cannot be expected. The first care of all societies formed for the improvement of our science should be to prepare the forms of such experiments, and to distribute the execution of these among their members.

Von Thaer, *Principles of Agriculture.*

PAPERS READ

BEFORE THE

ENGLISH AGRICULTURAL SOCIETY.

I.—*On the present State of the Science of Agriculture in England.* Read March 13, 1839.

Though the national importance of husbandry will be at once admitted by every one, it may be well at the outset of our undertaking not to content ourselves with a general notion of that importance, but to look for a moment at some of the items which constitute its annual value. The wheat produced in England and Wales is estimated by Mr. Mac Culloch, one year with another, at 12,350,000 quarters. This single head of produce, therefore, at an average price of 50*s.*, will amount to nearly 31 million pounds sterling, yearly. The oats and beans have been reckoned at 13,500,000 quarters, and will give another head of 17½ millions sterling per annum. The grass lands, again, are supposed to yield, year by year, produce worth very nearly 60 millions sterling (59,500,000). The practical inference to be drawn from these large numbers is obviously this,—that, if by any improved process it be possible to add even in a small proportion to the average acreable produce either of arable or pasture land, this increase, small as it may seem, may be in fact a very large addition to our national wealth. The average produce of wheat, for instance, is stated at 26 bushels per acre: if, by a better selection of seed, we could raise this amount to 27 bushels only, a supposition by no means unlikely, we should by this apparently small improvement have added to the nation's annual income 475,000 quarters of wheat, worth, at 50*s.*, about 1,200,000*l.* yearly, which would be equal to a capital of 24 millions sterling gained for ever to the country by this trifling increase in the growth of one article alone, and that in England and Wales only.

But it is not merely with regard to the total of any branch of produce that numbers afford a striking result. The value of one crop of a single article of produce on an individual farm may be large, and the loss of that crop very serious; and since in the

improvement of agriculture we have to look, unfortunately, at least as much to the prevention of loss as to the increase of profit, it may be worth while on this head to take an instance from a vegetable of seemingly inferior value, the turnip.

It is well known that in the south of England, during two or three dry summers preceding the last, many farmers have lost nearly the whole of their turnip crops; and that by the drought and the ravages of their accustomed foe, the turnip-fly only, independently altogether of their new enemy, the black caterpillar: after repeated sowings, a crop came up, but so late in the year, that, for want of warmth, little or no root was formed, and the crop could not be valued at more than 1*l.* an acre. In the north, on the other hand, where farm-yard manure is liberally given to this crop, and carefully applied in the ridges on which the seed is drilled in immediate contact with it, where bone-dust is also purchased for the same purpose, on such highly-cultivated ground there would be far less risk of failure arising from the ordinary causes mentioned above. There is many a light-land farm in the south of England, of 500 acres, on which 100 acres have not produced turnips worth more than 200*l.* or 300*l.*, while the more spirited culture actually practised in Yorkshire might have yielded 20 tons of Swedes, or 30 tons of turnips from each acre. It is difficult to reduce the advantages of this superior yield to a money value. At the price for which the former roots have sold in one neighbourhood we are acquainted with, a high price it is admitted, but still one that has been paid for many years, they would have been worth 2000*l.*: so that the difference in the result of the two practices would be 1500*l.*; or, if an acre of the land be worth 1*l.* yearly, a difference of produce from one-fifth only of the farm amounting to three times the rent of the whole. Without insisting, however, upon this case, which is an extreme one, the following quotation from a recent statistical work will be sufficient for all practical farmers:—"The produce of turnips, when cultivated in the broadcast manner, varies from 5 to 15 tons an acre; the latter being reckoned a very good crop. In Northumberland and Berwickshire, a good crop of white globe turnips, drilled, weighs from 25 to 30 tons, the Yellow, and the Ruta Baga, or Swedish, a few tons less."

We may consider, in another point of view, the national effect which might result from a general improvement of agriculture: that is, the additional employment that would arise from any general effort made on the part of the landowner or the tenant to improve permanently, as by drainage, for instance, the texture itself of the soil: we do not mean of waste ground, but of that which is already, and has been perhaps for centuries, in course of cultivation. If a pound, only, were thus laid out on each acre, a

very moderate supposition, we shall find that, since there are 48 millions of cultivated acres in Great Britain and Ireland, a demand for country labour amounting to 48 millions sterling would thus be created; a demand exceeding that which the railroad bills professed to create in the session before last, and far more advantageous in its effect on the labourers, inasmuch as the demand would be a gradual one, not severing them from their homes and their families. The assumed outlay, however, of a pound only, for the permanent improvement of each acre, is probably far too low: 3*l.*, 4*l.*, or even 5*l.*, would be scarcely too much. There is much wet land on which 8*l.* or perhaps 10*l.* might be laid out to advantage; but at 4*l.* only, the new progressive demand for the villager's only commodity, the work of his hands, would be about 200 millions. So large an outlay as this last must indeed, in part, be necessarily deferred for a long course of years; but in whatever degree it may arise, it has, on the other hand, the further advantage arising from the nature of the work to be done, that the demand would necessarily take place in the winter months, when labour is most difficult to be obtained, not in the summer, when the crops are in progress, and the labourer finds already sufficient employment.

It would be an inquiry of much importance to investigate in detail the manner in which this permanent improvement of the soil might be conducted in the various districts of England, but the subject is so extensive that it requires to be handled separately; or, rather, it must be a leading object of our members' future inquiries, to collect such facts and make such trials as may give a solid answer to so extensive a question. Great assistance may doubtless be derived from the knowledge which geological maps have lately afforded us as to the general outlines of the various subsoils which lie immediately under the surface of our fields, and powerfully affect, as every practical farmer knows, the produce of the upper soil through which alone the plough usually passes. These beds of sand, stone, or clay cross England, in irregular courses, from south-west to north-east: the blue lias, for instance, from Charmouth in Dorsetshire, to Whitby in Yorkshire; and thus, by the help of a geological map, it might be known that a mode of improvement which had been well tested on a farm in Dorsetshire, would be applicable, due allowance being made for difference of climate, to another in Yorkshire. Manifest, however, as is the assistance that might long since have been derived by agriculture from geology, we know no book which has endeavoured until very recently* to secure that kindred aid for the Science which

* In 1837 Mr. John Morton had the merit of publishing a work on the application of geology to agriculture.

is the immediate object of our Society's labours. But, although it is impossible to follow this question of the permanent improvement of soils into all its details, it may not be amiss to look for a moment at its more general features; bearing in mind, that we are not now seeking for positive conclusions on which we would recommend that immediate outlay should be made on a large scale by practical farmers, but are endeavouring, as is the business of societies which desire to enlarge the bounds of actual knowledge, to obtain such a bird's-eye view of the field of inquiry as may show us what are the lines by which we may best hope to effect our advance into a country we desire to explore. All subsoils, then, as has been said, may be roughly divided into clays, sands, and stones—or rather the clayey, sandy, and stony: in the two former of which, the upper soil generally partakes of their mechanical nature, that is to say, the soil resting on clay will probably be close, and on sand loose; while in all the three it will chemically partake more or less of the subsoil's nature, that is, its substance will usually resemble, more or less, the bed on which it rests, for the plain reason, that it has partly been formed by the wearing and breaking up of that bed. Where sand predominates in the soil and subsoil, thin veins of clay are not of unusual occurrence in the latter, and where these are found they may be turned to great advantage; but to all sandy ground the Flemings have long applied a method of singular perseverance and proved success, which is shortly as follows. They dig trenches of rather more than a foot in width, and about a foot deep, over their field, at such a distance from each other that the intervals or lands between them are five times the width of the trench, from the bottom of which, assuming the soil to be ten inches deep, they have therefore dug up besides two inches of subsoil, and as they proceed they fling the whole over each land on which the seed has been previously sown, which they thus cover. The trench, being shifted sideways each year, and the same process renewed, at the end of six years two inches of the whole subsoil will clearly have been mixed with the upper surface, and the soil deepened by that amount. The original trench is then dug perhaps two inches lower, and at the end of another six years two more inches, at least, of depth, will have been gained. In this way, after four or five courses of trenching, that is to say, after twenty-four or thirty years, the soil is brought to a depth of 18 or 20 inches of uniform quality.* Nor does the industrious Fleming fold his arms when this labour of a life has been accomplished. The bed of mould into which he has converted the natural ground is preserved by

* See Flemish Husbandry, by the Rev. W. Rham, p. 71.—Library of Useful Knowledge.

similar toil. On a farm called Vollander, a little beyond Courtray, consisting of about 140 acres, the Rev. Mr. Rham went over a field of 106 acres, the whole of which has been repeatedly trenched, by the present occupier we imagine, to the depth of 2 or 3 feet. A deep soil, indeed, has this double advantage over a shallow one, even though both be equally sandy—that during dry weather roots can descend deeper in search of moisture, and that moisture rises from below, by capillary attraction, more freely towards them. But where veins of clay are found interlarding, as it were, the sand, the advantage will be far greater, because the sandy soil will be brought now into that moderately adhesive state which will entitle it to be ranked as a loam. Indeed, where clay is not found on the very spot, it may often be brought, as has long been the practice in Dorsetshire and in Norfolk, by horse-labour, from a moderate distance. It is worth remark that, in another part of this country, and on a different description of light soil, strong as is the disinclination of British husbandry for the use of the spade, great improvements have for a long time, over an extensive district, been effected by lifting clay from below and laying it upon the surface. It is the peat-district of Lincolnshire to which we allude. Here the soil consists of light vegetable matter, half-decayed fibres of plants, clothed in its natural state with rushes or heath. A handful of it presents very much the appearance of rappee snuff. At a depth varying from one to many feet lies a very stiff blue clay of the consistence of soap. When the land is brought into cultivation, trenches are opened down to this clay, and a heavy dressing of it is laid on the face of the ground, which three years afterwards is found to be imperfectly mixed in small lumps with the peat. At the end, however, of twelve years, after three such doses of clay have been given, a specimen which we have seen from this same ground, instead of a brown powdery substance like rotten bark, presents the appearance of a dark grey, rather stiff, loam not dissimilar to the garden-mould which is usually met with round London, capable of bearing heavy crops of cole oats and wheat in rotation, being, in fact, the soil of a most valuable description of farm, which has been manufactured from the two steril raw materials, pure peat and mere clay.

It might be supposed that the reverse of this process would also succeed, and that, as sands and peats are made firmer by the admixture of clay, clayey soils might be rendered more porous if sand were carted upon them. It has been, indeed, so supposed, and the attempt has been made, but no instance is known in which it has been found to succeed. The expense of laying on the large quantity of sand that would be required must probably more than swallow up any profit that could be derived; and although cold lands with retentive subsoils have, in many dis-

tricts, been much improved by covered drains, more or less effectively made, the hope of bringing them to a thoroughly free-working genial temper had been, until lately, almost abandoned. Mr. Smith, however, a manufacturer of Deanston, near Stirling, some years since applied his mind to this subject; and, as the practical farmer who has this year won the first medal of the Society states Mr. Smith's process to be the greatest improvement effected in agriculture since the introduction of turnip-culture, (that is, for the last century,) it is impossible to pass it over, although, of course, its introduction is too new to be placed already altogether beyond the risk of disappointment. Mr. Smith's mode of dealing with a clayey subsoil, which holds up in the soil the water that has fallen in rain, and thus exerts some unexplained evil influence on plants fitted for the food of man or of cattle, is as follows:—That gentleman invented a heavy iron plough, resembling the common plough, but differing in this respect, that, having no mould-board, it splits the ground, but does not turn it over; and he uses it thus:—at the same time that an ordinary plough goes along and turns over the surface of the wet land, the share of the subsoil-plough following, passes through and splits the whole of the subsoil to the depth of 18 or 20 inches, and the rain-water sinks, of course, so much lower. Mr. Smith, however, does not allow the rain to lodge here: he has previously dug covered drains about 3 feet deep, made thus deep in order that his underground-plough may have room to pass over the covered channel which is left for the water to flow along in the lower part of these drains after they have been filled in above; and he states, that in this way he can not only produce, artificially, a porous subsoil instead of a close one, but that this clayey subsoil, having been so subdivided, becomes mellowed by the action of air and of water, and that thus, after a few years, a portion of it may be safely brought up by deep or trench-ploughing, and turned over upon the surface, so that the cultivated soil, by this third process, is to the same extent deepened. To whatever extent the Deanston system may be found applicable to the clay-lands of England, a revolution will be at the same time effected in their mode of culture by the introduction of the turnip upon them.

With regard to that portion of England which lies on a stratum that may be called rocky, much of it will be found to have the immediate subsoil of clay, and to fall therefore properly under the last head; and even where the subsoil is of stone, the stone may be so interspersed with clay, that thorough draining may be equally requisite. Where that stone is a dry gravel, it may be worth the trial whether the roots of some plants cannot be enabled to descend into it by means of the subsoil-plough. Such an experiment appears, by a communication from one of our members, to

have succeeded at Heckfield.* A considerable portion of the stony soils belongs to the great chalk formation which, resting on the basis of Hampshire, flings its arms widely, in four directions, as far as the sea, through Dorsetshire, Sussex, Kent, and Yorkshire. On this extensive tract another, and singular, mode of permanently improving the texture of the soil, by blending with it a part of the subsoil, has been long and successfully, though very partially, practised. Pits, like wells, are sunk in the field, by workmen used to the business, and from the bottom of these the best sort of chalk is brought up with a windlass, to be afterwards spread over the surface; which thus, in the winter months, when the operation should take place, that the lumps of stone may be shaken to pieces by the frost, presents at a distance the aspect of a field covered with snow. The benefit of this rather expensive operation has been long acknowledged, though its mode of action has not been explained. It is less surprising, indeed, where the upper soil of the chalk formation consists of a thin layer of reddish clay, left behind by the Plastic Clay formation; but even where that soil is a shallow sheet of earth, that appears to be made up of fragments of the stone upon which it rests, this ancient practice of laying on a fresh coat of that very stone is stated to be equally advantageous. Enough, however, has now been said to prove how much remains to be done for the permanent improvement of the English soil. Indeed, while it may with truth be affirmed that our husbandry, on the large scale, stands in the first rank, as far as the surface of the ground is concerned, it must equally be admitted, as regards the subsoil, to be yet in its infancy. There is scarcely a situation where, however wet, or dry, or stony may be the natural ground, a kitchen-garden, with a bed of mould two spades deep, may not gradually be formed by the constant, long-continued care of the gardener. While the sand is stiffened, and the clay mellowed, and both deepened, the very stone is probably, by length of cultivation, worn down into soil. Nor can British husbandry be considered complete in this department until all the farms of this country, like those of Flanders, are brought into the same condition of garden-like temper and depth.

If we suppose the soil of a farm to have been provided with a free and healthy subsoil, the next subject to which the inquiry of agricultural science may be directed is the manner in which that soil should be prepared for the reception of the intended crops; but it is unnecessary to do more than to touch upon one or two of the principal heads. The most simple and ancient of rural instruments, the plough, though probably much more than

* See the letter of Mr. Shaw Lefevre, No. V. of this Journal.

2000 years old, has recently received great improvement, and the best construction of it is even yet matter of controversy. There is no doubt that, by giving a more suitable curve to that part of it, the mould-board, which turns over the earth which has been detached with the share, and by substituting iron for wood on its surface, the friction has been so greatly diminished, that the new ploughs, being in other respects also of a far better shape, effect a diminution in draught, which may be estimated within compass at the saving of half a horse's labour on a team of three horses; and the Scotch or swing-plough is now very generally used with two horses, the ploughman holding the reins. Nothing shows more the necessity of communication among the agricultural body than that the old cumbrous machines, with a high carriage in front and two large wheels, drawn by four heavy horses, should still be retained even on the light soils of some of our southern counties. Still it is yet a question whether the advocates of the swing-plough have not gone too far when they have asserted that there is no land so stiff in which it may not be worked by a pair of horses; and it is indeed almost admitted that, on parts of the London clay formation, they have been beaten by the strength of the ground. It is even doubted whether one wheel might not be advantageously restored to the plough; and those ingenious mechanicians, the Messrs. Ransome, of Ipswich, have constructed a plough which admits of being used without a wheel, with one wheel, or with two. These doubts should be cleared up with regard to different soils by observation; and it may be worth inquiry whether ploughs of different constructions, with different amount of horse-power, may not be applicable to the same soil in various stages of cultivation, in first breaking the stubble, for instance, on heavy land, and in the cross-ploughings which follow. The other ancient implement, the harrow, is confessedly a most imperfect one, as its downward pressure is insufficient, and in the wrong direction, for cleansing from weeds the ground which it scarcely penetrates. Mr. Finlayson's harrow, however, as it is called, though in fact a new and ingenious implement, is little used by practical farmers in some of our southern counties; but this harrow, as well as the further improvement, inadequately named a scarifier, is not only efficient for cleansing the land, but may sometimes be made also to supply the place of the plough. The use of another instrument, the drill-machine, a more complicated one, by which the seed is laid in regular rows, has lately become frequent in southern as well as in northern England, though it has established itself so slowly, that, for a long time, travelling-machines of this kind have made yearly journeys from Suffolk as far as Oxfordshire, for the use of those distant farmers by whom their services are required.

But, before the seed is sown, manure must previously have been applied, either immediately or in some former stage of cultivation; and here questions large and numerous open themselves to the inquiries, and demand the experiments of a body which aims at raising the art of husbandry to the rank of a science possessing definite laws. Whether farm-yard dung should be applied, recently made or in a more advanced stage of fermentation; whether it should be laid on the field in the autumn, and covered over for the winter by ploughing alternate furrows only—a process technically known as raftering, from the ribbed appearance which it gives to the field; or should be laid on in the spring, immediately before the turnip is sown; whether its efficacy be increased by mixing it in heaps with earth, technically known as compost-heaps; whether the manure of a farm should be applied entirely to the green crops; or whether, as is a common course, recommended by the hope of immediate gain, it should be shared by the wheat; —these are all questions in the minds of practical farmers, at least—as is shown by their opposite conduct upon these heads—which the science of agriculture, if it ever become a science, is bound therefore to answer. There is also, as to the very formation of farm-manure, an important difference of management between ourselves on the one hand, and the oldest practical farmers, our neighbours the Flemings, on the other. The Flemish cattle are not allowed to run at large on the pastures, but are tied up in buildings, where they receive a daily supply of green food newly cut, and a tank is formed near at hand, which receives the runnings of the stalls, and from which the liquid manure is carried in tumbrils to the arable ground. Not only are our farm-yards managed less closely in this important particular, but, as our cattle are in the field for a great part of the twelvemonth, it may be questioned whether their droppings do not in a great degree lose their fertilising property by the action of the atmosphere as they lie scattered upon the surface. There is no doubt that, on the other hand, rank tufts of herbage are produced by the excess of manure in spots of ground upon which it falls. The advocates of the soiling system, as it is called, have acted upon that system for centuries, and they assert that a very large saving is effected by the uniform consumption of the grass, which is another result of this mode of management. A system backed by such high and ancient authority must surely deserve inquiry into its merits. This last question, however, is a double one, involving on the one side the comparative amount of fertilising substance produced for the use of the soil, and on the other the beneficial effect of the food on the condition of the animals themselves: but this second branch belongs to a distinct head of inquiry—the feeding of cattle.

There is another class, however, of manures which deserves inquiry as much as any branch of agricultural practice, and which also seems to lend itself more readily to our experiments,—those which are not produced by animals upon the farm, whether in the yard, the stall, or the fold, but which are procured by the farmer, either from the earth, lime, for instance, marl, peat-ashes, gypsum, nitre; or, as the refuse of certain trades, such as bones, rape-dust, malt-dust, even woollen rags. The former of these, which may be called the mineral manures, are now perhaps in more limited use than in past times; still, in Devonshire and some midland counties, lime is regarded as indispensable, and is carried very long distances over bad roads at a heavy expense; but marl, which was once so highly valued, is in many districts almost forgotten. Not so with the second class, which may be called the refuse manures: of these, bones in particular form a new feature in our husbandry, and their consumption is yearly increasing. In the year 1823 the declared value of all the bones imported from foreign parts was but 14,395*l.*; in 1832 it was 78,000*l.*; in 1835 it had reached 155,279*l.*; in the next year, 1836, it advanced to 171,806*l.*; and in the following year, the last of which we have any account, it amounted to no less a sum than 254,600*l.* This is the declared value, which the real value greatly exceeds; and it excludes altogether, of course, the large quantity of this article which must be produced at home. At present, bones are chiefly applied to the turnip-crop, and on some soils their effect is certain and great. Yet no single instance can show the necessity and advantage of scientific inquiry more than this new manure. It is well known that bones contain a large portion of oil, which is usually extracted by boiling; and it might naturally be supposed, since oily substances are used separately as manures, that the natural oil should at least be left in the bones, which are intended to be so applied; and farmers, accordingly, who purchase bones have complained that these had fraudulently been boiled. Now, contrary to expectation, there is reason to doubt whether the bones are not actually improved as a manure by the loss of that oil, by which, if such be the truth, their own active principle, whatever it be, would appear to be deadened and sheathed. This is a point that may be easily tested; but there are larger questions connected with the use of bones. They are, as is well known, an expensive manure, and their price is rising; but it is by no means known in what quantity they should be applied. At 10 bushels to the acre, however, if the cost be 3*s.* per bushel, the outlay is already large, namely 30*s.*, a sum probably exceeding the rent. At 20 bushels it will be 3*l.*, or 300*l.* for a field of 100 acres. But as yet there is reason to doubt whether any increased quantity beyond 25 bushels of small bones

produces any increased benefit to the crop; and no one will venture to assert that he knows the point beyond which an additional outlay is a mere loss of money and waste of a manure which is becoming daily more scarce. Again, as to the kind of soil on which bones may profitably be applied, there are some on which they have as utterly failed, as they have signally succeeded on others; but, on this important point, as on the preceding, the valuable answers returned, chiefly by practical farmers, to the questions, sent out by the Doncaster Agricultural Association, at the instance of Mr. Childers, afford the only authentic data to which we can refer at present for guidance.

After the ground has been duly prepared, there is still ample room for inquiry and for improvement. On the best season of wheat-sowing, for instance, there exists great difference of opinion amongst cultivators. Dr. Mavor, in his 'General View of the Agriculture of Berkshire,' published no longer ago than the year 1813, states that, on the chalk-hills of that county, wheat was sown as early as August. This year a practical farmer of that very district has given his opinion that it matters not how late wheat is sown, and that December is soon enough. The quantity, too, of grain to be sown is a matter of varying practice, and there are high authorities for thick sowing and for thin. Yet a saving of half a bushel of seed, if it can be properly made, will be a gain of 3*s.* per acre; or of about one-sixth of the average rent of arable land to the renter, and of 240,000 quarters, or 600,000*l.*, to the country each year. Now, this question can obviously be solved, not by loose argument, or appeals to practice, which is always appealed to while and where each practice obtains, but by careful, extended observation continued through a variety of mild and hard winters, wet and dry springs and summers. As to the quality of seed to be sown, no one can doubt that much good may here be reasonably expected from increased attention.

That well-known variety of barley, the Chevallier, is an instance in point. The discoverer, Dr. Chevallier, has obligingly sent the following account of its origin, in reply to an inquiry from our secretary:—"An extraordinary fine ear was observed and selected, by a labourer of mine, in the parish of Debenham, 1819; in the spring of 1820 I planted 27 grains in my garden: in 1825 I planted half-an-acre of this species, and half-an-acre of the common species; the land under precisely similar conditions of cultivation. The produce of the first amounted to 8½ coombs; of the second, 6½. The ears of the first averaged 34 grains; the second 30: the grains of the first heavier, as four to five. In the course of five or six years it was generally accepted and approved in my neighbourhood, as I promoted its fair trial, and charged only the current market-price for it."

It is less necessary to enter into detail on this source of future improvement, as the subject is fully treated in another part of this Number *; while, in the single experiment therein detailed, ground is shown for supposing that the prolificness of one species of grain, the most important, namely, wheat, differs extremely in its several varieties.

But it is not enough for the farmer to know the best management of an individual crop, even of all crops singly, unless he know also in what order of succession they should follow each other. It is by improved knowledge of this order, and a better selection, that much improvement has already been effected in British agriculture. It is well known that crops of the same kind following each other become rapidly less productive; whether by exhausting the land of some fertile property, or by depositing, as has been lately supposed, some excrementitious matter injurious to the growth of their own species, though favourable, perhaps, to the luxuriance of some other tribe. Be this as it may, no one would now think of growing, as formerly, wheat, barley, 'and oats in succession; and though Mr. Hitchins, land-surveyor, of Brighton, states that, in his recollection, the tenants of a gentleman living in Sussex, when a clause was introduced into their leases prohibiting them from growing *more* than *two* white crops in succession, complained that they could not hope to defray their rents if fettered by such restrictions, few good farmers at present, on light soils at least, come even up to those limits, by raising even two white crops, as they are called, in immediate succession. It is on these light lands, indeed, that a due rotation of crops has so signally succeeded, that, whereas they were formerly considered of very inferior value, they are now more readily occupied than those heavier soils, which, being in their nature more suited to the growth of wheat, were once valued more highly. And it is as much by the slow and almost insensible amelioration of such land, as by any increased breadth of cultivation, that the country has become in any degree capable of supporting the vast numbers which have been added to her population. A small parish might be pointed out, in which an aged farmer remembers the time when a single rick was all that it could produce of wheat in one year; whereas, without any increase of its ploughed ground, that same parish now yields five or six yearly. Its sandy soil was then drifted like snow before the wind, and the scanty barley might be sometimes seen borne away also; whereas the very fields, still called 'The Sands,' are now, by that glutinous quality which high condition imparts—by the droppings and the tread of the sheep which are fed on the turnips that now grow in garden-like order where before was

* See Paper VI. p. 39.

a naked fallow, compacted into a brown and adhesive, though still lightish, loam. But though the Norfolk or alternate, or four-course system of husbandry (so called because its simple rotation consists of turnips followed by barley, and clover by wheat) has conferred such great though silent benefits on the country, it may be doubted whether that system have not accomplished all that it is capable of, and must not pass into another. Already it has begun to fail in one of its green crops, probably in the other. The red clover, it is admitted, can be no longer repeated once in four years, and the substitution of white clover, or of rye-grass, in the alternate fourth year, or the prolongation of the course to five years, by sowing rye-grass with the clover, and thus leaving the ground in grass for two years successively, are but imperfect remedies. The evil, however, is likely to increase; for in Flanders, whence the red clover was originally brought over, and where the land has been longer tired with its repetition, it has been destroyed in whole districts by a grey parasitical plant called *orobanche,* and the only cure has been the entire suspension of its cultivation in those districts for many years. It is well known, also, that in Norfolk, where the turnip has been longest cultivated, that root has become subject to a disease which distorts it with unhealthy excrescences; and it may be worth inquiry whether, apart from dry seasons and the depredations of insects, the late general failure of the turnip be not in some degree owing to its too frequent repetition.

Such being the ill results of a too scanty rotation, which consists in the endless repetition of four crops, the remedy must of course be sought in a greater diversity; and here we cannot but look to that neighbouring country whence our green crops were first derived. In Flanders we find rotations, of great richness and endless diversity, carried over a term not of four years, but of ten, eleven, and even fourteen.* Into all of these potatoes enter, consumed on the farm, being in fact the chief food of the cattle during the latter part of winter and the beginning of spring. Carrots, too, are sown on the same ground with barley or pease, and after either grain is harvested, come also to maturity in the autumn of the same year. The barley-harvest, however, is much earlier than in this country. But though our summers do not certainly encourage such double culture, pease might be early enough ripe even with us to admit of its trial; but, at all events, the Flemish carrot, a white variety, may be worth cultivating as the crop of the year, since it is said to yield 22 tons by the acre, where the common orange or Dutch carrot gives but 11. "Parsnips, it appears, are grown also where the soil is too heavy for carrots,

* See the account of Flemish Husbandry, in three Numbers lately published in the 'Library of Useful Knowledge.'

and, being extremely hardy, are left in the ground during winter, and drawn only as they are required for immediate use. They are thought not so good for milch-cows as carrots, but superior for fatting cattle.' We have long had another root, the mangel-wurzel, which may serve, if grown on a part of the turnip-field, to prevent the evils arising from the too frequent recurrence of that principal crop; and it is well known, if stored up, to come into useful service for ewes with their lambs in the spring. There is a mode which our own farmers have taken towards the doubling of crops, not indeed on one piece of ground at one time, but on one piece in the same year. Between the wheat-harvest in August, and the sowing of turnips in June, there occurs in the four-course system a gap of nine months' idleness for the soil. This interval is filled up, on a part at least of the wheat-stubbles, with a crop of rye, to be fed off green in the early spring, at the time when fresh food is most wanted for stock, and least easy to be procured. So far as this extends we have thus two crops where our forefathers left a naked fallow; and it may be worth inquiry again how far this system can be extended. But this important subject of the rotation of crops, though much may be done by individual enterprise, requires such minute attention to so complicated results spread over so long periods, that it is only on an experimental farm we can hope to see it fully investigated.

It might be supposed that when these different stages of husbandry had been successfully passed, when the subsoil of a farm had been mellowed, or rather when it had been gradually blended with the soil, and the soil itself might thus be said to have been brought to a double depth, when the surface of the field had been dressed with the most suitable manure, either natural dung, or artificial manure, whether of the mineral or refuse class, had been worked with the right implements, in the right manner, at the right time; sown with the most productive seed, and, above all, sown in the best course of rotation, when the crops thus prepared had been cleansed either by the hand or the horse-hoe (a method, this last, little known in the south of England, though long practised and approved for the turnip-crop in the north); but it might be supposed when the crops had been thus made ready, that nothing remained for the farmer but to await the fostering influence of the sky, the dropping rains and alternate sunshine, until after a joyful harvest, he should reap the reward of his toil at the neighbouring market. Little, however, does the sanguine calculator upon paper know of the farmer's real anxieties and frequent disappointments—of the blights, and rusts, and mildews; the insects, and the fungi, which falling, as if in an unseen cloud, on his fields, impair, if not destroy the vegetative power which he has so carefully and expensively endeavoured to nurture. There

is no department of agriculture in which minute inquiry is more needed than this: first, to examine accurately the various diseases of plants, and to note the habits of the animals which prey on them; then to ascertain, if possible, the remedies that may be applied; and the followers of kindred sciences may be fairly invited to aid us in the formation of this branch of knowledge, which may be called agricultural pathology. But even when the crop is ready for harvest, it must not be supposed that there is no doubt remaining, no room for further improvement. With regard to corn, much injury arises to it from its being exposed to wet after it has been cut, when it may be discoloured at least, and often begins to grow in the sward or the sheaf. If left too long, on the other hand, in the hope of dry weather, it becomes overripe, and a portion of the grain is lost by being shed on the ground. It is no new remark, however, that as soon as any portion of the straw has turned yellow, the ascent of sap from the root is cut off, and that though the ear be partly green, it will ripen henceforth as well when severed from the ground as it will if it be left standing. If this supposition be correct, it might enable the business of harvest to be commenced earlier, when a clear sky invites the reaper into the wheat-field; and would be so far beneficial, though not in a very material degree. The late ripening of the corn in the northern parts of this island, where from the moisture of the summers following cold springs, crops are sometimes not secured for two months after our southern harvest is ended, requires a more effectual remedy if such can be found; and it has been suggested, that as seed grown in southern climates retains for some time its habits of early ripeness, though grown under the more chilly sun of the north, seed might be advantageously borrowed by our northern farmers from the warmer parts of the country. The suggestion, however, can be regarded as yet merely as speculative. But the power of improvement does not cease when the corn is placed in the rickyard; and here we have not to inquire or to guess, but simply to look at the practice of the practical farmer in the Lothians and in Northumberland. There, instead of the thresher and his flail, may be seen the machine, not driven however by horses, for then the advantage might be more doubtful, seeing that the labour is distressing to the animals, and withdraws them, moreover, from the work of the fields, but impelled by wind or water, or steam, and that on almost every farm. In France, too, it appears that not only travelling threshing-machines are employed, as is the case here, but that it is proposed to work these by steam-engines carried with them. It may be objected, indeed, by the farmer, that if he gave up his hand-threshing, he would be at a loss to find employment for his men in the winter. The objection, however, shows a want of confidence in the power

of permanent improvement judiciously applied on the soil to bring back its cost with interest, nor can this objection be allowed any weight as long as a single acre of the farm is stagnant with water, or dry because the soil is shallow, while there is a possibility of its being deepened. Indeed, if you once establish a moving power on your farm, whether steam, water, or wind, it is not the labour only of threshing that may be saved to men or horses, but the winnowing, the dressing, the chaff-cutting; even the turnip-slicing machine, when the turnip is consumed at home, may be grafted on to the principal wheels, and thus borrow their motion. The more labour is thus set free from mere work of routine, the more will be applied to the further improvement of the parent of all agricultural labour, the soil. Having mentioned the turnip-slicer, we cannot but say that, while we would willingly rest the necessity for increased intercourse among the agricultural body, upon the varying practices which prevail in different parts of England with regard to the turnip alone, a strong argument may be drawn for it from the limited use even of this implement only. It consists in some simple machinery of knives, turned by a handle, enclosed within a box, above which is a trough into which the whole turnips are placed, and below which the slices fall into another receptacle: the whole may be placed on a wheel and two legs, and moved about the field like a wheelbarrow. The advantage is two-fold, saving the teeth of the old ewes, for which the Swedish turnips, especially, are too hard; saving the waste of this valuable root, which, when partially scooped out by the sheep, is rotted and trampled about with great waste. The economy effected by this simple machine, which costs but 6 or £7., has been stated to us by an authority which would at once be admitted as very high, to be no less than one-third of the whole produce. If it be taken, however, only at a fourth or a fifth, why, it may be asked, has not every farm in the country been long since furnished with this cheap apparatus? If a contrivance were discovered in Manchester which should save one-fifth of the cotton consumed in a manufacture (were such a saving possible) not a year would pass before most of the old machinery would be replaced by the new, and such changes are constantly taking place there, at the expense of many thousand pounds; but the turnip is the raw material of the farmer's stock, and the farmer is of the same enterprising race with the manufacturer: why, then, but on account of the separate and secluded scene of his industry, is the spread of agricultural inventions so slow—the extension of those which concern manufactures, so rapid; and what but a central connection of the cultivators of the soil can diminish the distance and remove the obstruction?

The mention of this last instrument has brought us to a most

essential element of farming, that we have hitherto passed by,—the animals which, while they embellish and enliven rural scenery, are indispensable to the fruitfulness of the soil. It is a subject which the English agriculturist may enter upon with satisfaction. There seems indeed to be in the people of this country a peculiar disposition and talent for encouraging the finest animal forms, and producing, by careful attention to the selection of the parents, new families, in which are perpetuated, by descent, useful and symmetrical excellence. It is not only the English race-horse, improved from the Arab and Barb, that is eagerly purchased and exported to every civilised country, but the Durham bull (like him too supposed to be descended from a foreign ancestor, derived in this case from Holland), the new Leicester sheep, and even the Berkshire hog, are the acknowledged sources from which other nations seek to enrich and refine the blood of their several live-stock. National gratitude requires that, whenever the new Leicester sheep is mentioned, the name of Mr. Bakewell, of Dishley, by whom it was produced, about a century since, from unknown parents, should not be forgotten; nor that of Mr. Colling, in connexion with our beautiful short-horns. This indeed has been the popular branch of English farming, and among its zealous patrons may be named the late and present Dukes of Bedford, the Duke of Richmond, the Marquis of Exeter, Lord Leicester, and Lord Spencer. Such indeed is the pleasure of seeing the form of the sire reproduced or excelled in the offspring (and the coins of the Sicilian Greeks show how fine is the form of the bull), that there is some danger lest the end pursued should be forgotten in the means of attaining it. Not that it can be necessary in an Agricultural Journal to vindicate our annual shows of fat cattle, since, although those cattle may be more fat than the ordinary market requires, the power of reaching that excessive size is the only test by which the capacity for acquiring useful marketable condition, at the cheapest expense of food and at the earliest age, can be tried under the encouragement of public emulation and competition. That object has been also practically attained to a high degree. The saving effected in the cost of production, through the early maturity of the new Leicester sheep, or of the cross between the new Leicester and Cotswold, has been calculated, by a practical farmer in Gloucestershire, at nearly 20 per cent.; that is to say, it would have cost about one quarter of the outlay more to supply the present quantity of mutton consumed in this country under the old system than by the new. This may be taken as a moderate estimate, so far as the new Leicester blood and its propensity to early fatness has hitherto extended. It may be worth the inquiry how far the South Down race has been improved in

this respect, or how far it may be capable of such improvement, and of thus combining rapid maturity with its own superior hardihood. There can be no doubt, however, that in many of our agricultural districts the pure improved blood, whether of sheep or cattle, is little known; and the extension of the advantages secured by the stage of perfection to which these animals have already been carried into such districts will arise, it may be hoped, from the Society's cattle-shows.

There is another point connected with cattle, on which the extension of our present knowledge, as practised in the northern districts, and inquiry as to the possibility of further improvement upon those practices, appears extremely desirable: this is the feeding of stock. In our southern counties the arable farm is kept in heart chiefly by the manure of the sheep-flocks, such flocks indeed as no arable farms can produce but in this country. The beasts kept during winter in the yard, sometimes poorly fed, and only not losing condition, trample the straw until it has the appearance, though it often possesses little of the virtues, of dung. On well-managed northern arable-farms, on the contrary, the cattle are tied up in the yard to be fattened, and are fed not only on turnips, but on large quantities of oil-cake, purchased at the expense often of many hundred pounds by the farmer. Now it is well known that the better the beast is fed, the more valuable is the manure produced, and that by oil-cake in particular its fertilising power is almost doubled. Interesting experiments have been made, at the instance of the Highland Society, with a view to ascertain the relative value of food in the stall-feeding of cattle; but much remains doubtless to be cleared up by experiments yet to be made. It may even be worth inquiry whether, on farms where fattening of stock is largely carried on, a somewhat harder course of cropping might not be permitted, without fear of impoverishment to the land. Pease, for example, and, on some ground, potatoes, are a scourging crop; but, if the pease, instead of being carried to market, are given to the farmer's stock, it may be a question whether the superiority of the manure may not more than compensate to the farm the previous loss of condition which the crop has occasioned. On this subject of feeding, it is impossible to pass over that heavy article of the farmer's expenses—the keep of farm-horses. Here, however, it will be sufficient to make a short extract from the printed Report of a club of practical farmers, who have for some time met at Harleston, in Suffolk, for the excellent purpose of discussing doubtful points of agricultural science. It will not be useless, however, first to give a list of the subjects which they had selected for the last year's inquiry, since it shows the spirit of improvement which is at work in the agricultural body.

"On the use of saltpetre as a manure.
On the management and cheapest method of keeping farm-horses.
On spade-husbandry.
On the best method of improving neat-cattle in the district.
On shoeing horses.
On stall-feeding.
On the best method of keeping farming accounts.
Whether or not it is beneficial to consume by stock any part of the straw the produce of the farm.
On chaff-cutting."

With respect, however, to our immediate subject, the Report of the Harleston Farmers, as it stands in the 'Mark-Lane Express,' Feb. 11th, runs as follows:—"Your Committee, in common with every member of the club, was astonished to find that, amongst a body of farmers, all residing within four or five miles of the place of meeting, all using a similar breed of cart-horses, and cultivating a similar description of land, such an astonishing difference in the expense of maintaining their cart-horses should exist, amounting, in authenticated statements, to upwards of 50 per cent., whether estimated at per head for each cart-horse, or per acre for the arable land." That is to say, not only, with an equal number of acres to plough, the horses of one farmer cost twice as much as those of another; in which case the difference might arise partly from the different number of working cattle maintained; upon which a second question would arise,—which farmer had too many, or which had too few?—but also the very same number of horses stood in to one farmer at double the expense which they did to the other. "What greater proof," the Harleston Committee very properly ask, "could be required of the necessity for discussion?—and if no other subject had ever been brought before your club, we are of opinion, that by debating this question alone it would have rendered incalculable benefit to the neighbourhood; for what member, who now learned for the first time that his neighbour was cultivating his land at much less cost than himself in one of the heaviest items in a farmer's expenses, but would go home and improve on his farm management?"

It appears then, even from the superficial survey contained in these few pages, that the practice of farmers varies greatly, in different parts of this country, on points where there is no question which practice is best. But it appears also that there are innumerable points of farming on which no one ought to give a positive answer, because no certain knowledge exists. How then is such certainty to be obtained on a matter which involves so large a national profit and loss? Surely, as in other sciences, by careful observation and well-considered experiment. But in many sciences this process, however difficult, is at least within the

reach of every inquirer. The chemist requires but a room in which to set up his furnace, and evolve his gases: not so the agricultural inquirer; he requires a large farm (for a small one would be insufficient), and a large capital, too, practically engaged in its cultivation. Neither would one farm be sufficient, since the results of its treatment would apply to one soil only, and subsoil, one climate and elevation; whereas there are, even in this country, many soils and subsoils, climates and elevations; and it can scarcely be expected that, either by individual or by public means, such farms should ever be provided in such number. Still, if we wish, as agriculturists, instead of uncertain local rules of practice, unknown beyond the districts in which they are severally handed down, to attain the knowledge of general certain laws, not less certain because liable to many equally certain local exceptions,—that is to say, if we wish to raise our important art to the rank of a science, this difficulty must be overcome. After all, however, it is not a difficulty with which we alone have to cope. On the contrary, botany, geology, and other sciences which might be named, depend equally upon the collection of numerous minute facts, by individual observers, over a large surface, even that of the whole globe. But it has been found, in these and in many departments of knowledge, that by the formation of permanent societies, having the promotion of the particular science for their special object, great progress has been attained. Such a society, by bringing together men who are already desirous of a common end, encourages their zeal, and attracts other labourers into the field. It also regulates their endeavours, as their mutual intercourse shows them more clearly the points of doubt which particularly require to be cleared up. Further, such a society, as it spreads forth its branches, provides a scattered but disciplined host of observers and pioneers. Lastly, the facts thus obtained are recorded, and gradually accumulate, until, by careful comparison of the points in which they agree, some general rule is discovered; and, of those in which they differ, the exceptions are also found, and the causes of those exceptions. It is thus that geology has grown into a science within the present century. It may be said, indeed, that the labour of observation on so minute and extended a scale is great, and the prospect of practical improvement, at best, problematical. It might be asked, in reply to such spiritless objections, why agriculture should be the only science in which patient pursuit of knowledge found no reward?—or whether, while the philosopher, from mere love of science, seeking, for instance, to learn the fixed causes which govern the most changeful and seemingly accidental of all natural things, notes down daily, from year to year, the shiftings of the wind and the rise or fall of the weather-glass, hoping that

at last he may be able to arrange these endless vicissitudes under some regular system, and thereby know of a certainty the signs of the sky—we, the owners and occupiers of the land, on a matter wherein we have a strong interest, in which the whole nation, as consumers, and many millions as labourers, have an interest also, on a matter too in which so much improvement has been long ago made, so much is still making, and so much is in prospect, should alone be so faint-hearted, or so short-sighted, as to doubt that, by our combined exertions, the bounds of our own science may be enlarged; and that, besides this hope, which is sufficient for the followers of other sciences, we may at the same time advance our own interests, give more bread—not to our loss, but with our own gain—to our dependent workmen, and strengthen at the same time the country's resources?

But such arguments are not needed. On the contrary, there are proofs on all sides, whether in the weekly increase of this Society's numbers, in the local societies which are springing up in every county, in the farmers' clubs which are being formed, the new machines which are invented, new manures, and new varieties of seed which are announced—above all, and practically, in the improving face of the country; which show that the British farmer is not liable to the charge of being blindly attached to ancient practice, but is ready, with the caution however which befits a man whose livelihood is in agriculture, as well as his pleasure, to adopt improvements in his art, and even to seek for them—that the spirit of inquiry is afloat—that this Society is formed therefore in an auspicious time, and does but represent the wishes of those whom it seeks to unite in the road of knowledge, which they are already disposed to pursue, and that its exertions will be engaged, not so much in stimulating as in methodizing the general desire for improvement. How we may best combine and order the separate efforts of our individual members, on the details of whose exertions, duly combined, in the various paths of our diversified art, to a common end, and carefully and honestly made known to our body, our slow but steady progress will mainly depend—must form the future subject of our common consideration.

II.—*On the Selection of Male Animals in the Breeding of Cattle and Sheep,* by the Right Hon. Earl Spencer, President of the Society. Read February 20th, 1839.

More from wishing to set an example to others, than from any hope that what I myself can suggest will be practically useful, I submit to the English Agricultural Society the results of my experience in an important part of that division of farming, to which my own attention has been particularly applied,—I mean the breeding of stock. The part to which the following observations apply is the selection of male animals. A large proportion of farmers breed sheep and several breed cattle; to all who breed either this subject is one of great importance.

The object of a certain number is to breed bulls or rams for the purpose of selling or letting them, but that of the majority is to breed oxen or wethers for the purpose of grazing. The first of these classes is very well aware of the importance of selecting good male animals, and profess to spare no trouble and to be very indifferent as to the expense which they incur in obtaining them; but with respect to those whose object it is only to breed oxen or wethers, I am afraid the case is generally very different, and they take very little trouble and expend as little money as possible in procuring the male animals to which they put their females; that is, they consider as a matter of indifference that on which the profitable or unprofitable nature of their occupation mainly depends.

It is admitted by every one that the bodily and constitutional qualities of the offspring are usually similar to those of the parents, either combining in various proportions the qualities of both parents, or taking entirely after one. I should say, as respects cattle and sheep, that, in most cases, the qualities of the male parent predominate in the offspring. I have also observed that the worse-bred the female is, the more will this be the case when she is put to a well-bred male. This observation was first made, I believe, by the late Mr. Berry, in an essay, for which he received a prize from the Highland Society. He accounted for it thus: a well-bred animal means one whose ancestors for several successive generations have all been good, that is, have all possessed the peculiarities in constitution and shape which it is the object of experienced graziers to obtain in their stock. The characteristic, therefore, of the family of such an animal will be such peculiarities; but the ancestors of a badly-bred animal will probably have varied in every possible way, and therefore there will be no distinguishing characteristic in its family; it is consequently most probable that the offspring produced from a cross between two animals so circumstanced will be more like the one in whose family there is a distinguishing characteristic, than the one in whose family no such characteristic

exists. The common but, I believe, mistaken notion, that the offspring from the first cross is better than that from any subsequent one, probably arises from the improvement in the first instance being so much more apparent than, for the reason given above, it is likely to be in any one generation afterwards. Now it is known to all graziers that the attempt to fatten an animal, who possesses no feeding propensities, produces loss instead of profit. If the above observations are correct, the feeding propensities descend from the sire; it is quite just, therefore, to say that a breeder of cattle or sheep, who considers it a matter of indifference what sort of male animal he uses, does consider it a matter of indifference whether he gains profit or incurs loss.

The first object which any breeder of cattle or sheep must keep in view, whether he intends to breed bulls or rams, or whether his aim is merely to breed oxen or wethers, is that the stock which he breeds shall be healthy. The first thing, therefore, to be considered in the selection of a male animal are the indications by which it may be possible to form a judgment as to his constitution. In all animals a wide chest indicates strength of constitution, and there can be no doubt that this is the point of shape to which it is most material for any breeder to look in the selection either of a bull or a ram. In order to ascertain that the chest of these animals is wide, it is not sufficient to observe that they have wide bosoms, but the width which is perceived by looking at them in the front should be continued along the brisket, which ought to shew great fulness in the part which is just under the elbows; it is also necessary that they should be what is called thick through the heart. Another indication of a good constitution is, that a male animal should have a masculine appearance; with this view a certain degree of coarseness is by no means objectionable, but this coarseness should not be such as would be likely to show itself in a castrated animal, because it thus might happen that the oxen or wethers produced from such a sire would be coarse also, which in them would be a fault. Another point to be attended to, not merely as an indication of a good constitution but as a merit in itself, is that an animal should exhibit great muscular power, or rather that his muscles should be large. This is an usual accompaniment of strength of constitution, but it also shows that there will be a good proportionate mixture of lean and fat in the meat produced from the animal; the muscles being that part which in meat is lean. A thick neck is in both bulls and rams a proof of the muscles being large, and there can hardly be a greater fault in the shape of a male animal, of either sort, than his having a thin neck. I am inclined to say, that in the new Leicester breed of sheep, which is the breed to which I am accustomed, a ram's neck cannot be too thick. Other indications of muscle are more difficult to observe in sheep than in cattle.

In a bull there ought to be a full muscle on each side of the back-bone, just behind the top of the shoulder-blades; he ought also to have the muscles on the outside of the thigh full, and extending down nearly to the hough. It will seldom happen that a bull having these indications will be found deficient in muscle. With respect to rams, my own observation does not enable me to point out any other indications of muscle except the thickness of the neck, which I have mentioned above; if other farmers are able to point out any, I would only say there is scarcely any thing to which they ought to pay greater attention.

As I am writing for the use of farmers, it is quite unnecessary for me to attempt to give a description of what is considered a well-shaped bull or ram; it is also obviously impossible to express in words what is meant by good handling. It is sufficient to say, therefore, that no male animal is fit to be used at all as a sire whose handling is not good, and that the more perfect his shape is the better. The above observations apply to breeding generally; for, whatever may be the sort or size of the animal intended to be produced, there is no doubt but that good health, propensity to fatten, and good shape, in all cases, ought to be aimed at. But there are not only different breeds, both of cattle and sheep, but experienced and very good farmers differ very much in opinion as to which peculiarities of shape and size are to be preferred, even among animals of the same breed. It is therefore very desirable, before any man commences to breed either cattle or sheep, that he should make up his mind as to the shape and qualities he wishes to obtain, and steadily pursue this object; if he does so, there is very little doubt but that he will succeed in having a herd of cattle or a flock of sheep possessing the characteristics which he at first intended they should possess; but if, on the other hand, he breeds at one time with the view of obtaining animals possessing one sort of shape, and at another time with the view of obtaining animals possessing a different sort of shape, the probability is, that his stock will possess neither the one nor the other in any degree of perfection. Having made this decision, he should take care that the individual male animal which he uses shall possess the qualities which he requires. In addition to this, it is of great importance that these qualities should have been characteristic of the family from which the animal is descended; and if he is old enough to have been the sire of any number of offspring, it is of a great deal more importance still that they should possess them. Because all the perfections of shape and quality which the best judge may wish to find in a male animal are, after all, only indications of what the stock got by him will probably be: the seeing, therefore, what they really are is much more satisfactory.

There are few breeders, of cattle more especially, who breed

upon so large a scale as to enable them to keep many male animals at the same time in use. A man, therefore, can usually only look at the general qualities of the females which he possesses, and observe what are the faults most prevalent among them: these he should be particularly careful to avoid in the male which he intends to use. It is sometimes said that a male animal ought to have no faults, and undoubtedly it would be very desirable that this should be the case; but, unfortunately, no such animal exists. All a man can do, therefore, is, to avoid putting a male and female together whose imperfections are the same, so as not to increase the fault already existing in his stock. If a man breeds upon a large scale, and uses several males at the same time, he can, of course, attend to this more effectually than if he uses only one. In this case, he should select and put together the males and females individually, so as to endeavour to correct any imperfections which either of them shew. Most breeders of sheep, indeed, do use more than one ram, and all who pretend to take any pains in improving their flock divide their ewes, so as to put them with the ram who will most probably effect this object. I need not say that those (some of whom, I am sorry to say, still exist) who turn two or three rams of different shapes and qualities into a field with all their ewes, without attempting to make any selection among them, have no right to expect to be successful breeders; and if they do expect it, will certainly be disappointed. I believe the general opinion of breeders is, that it is disadvantageous to endeavour to correct any fault in the shape of a female by putting a male to her who possesses, in extraordinary perfection, the merit in which she is deficient, but who in some other part of his shape is faulty. My experience leads me to say that this mode of endeavouring to correct a fault is frequently successful. It would be better that none of the females from which a man intends to breed should be faulty in shape to any considerable degree, but it almost always will happen that some animals, possessing an excellent constitution, good blood, and a great propensity to fatten, and therefore such as the owner would very unwillingly cull, will fail decidedly in some part of their shape. I would say that, when this is the case, it is worth while to try the experiment of putting to them a male remarkable for his perfection in this failing part; and, in my opinion, such a male will be more likely to correct the fault, than one who shows no one part of his shape very superior to the rest. The late Mr. Chine, whose eminence as a surgeon is very well known, published a tract upon the breeding of domestic animals, which contained, as might be expected, most valuable information. His suggestions are such as ought to be very carefully attended to; but it is probable that his meaning has been mistaken in one recommendation which he gives, namely, that in which he is understood

to say that it is always desirable that the male should be smaller than the female. When he makes this observation he is speaking of the crossing of different breeds, and probably only means that in a cross between a large breed and a small one, the male should be taken from the small breed, and the female from the large one. It is hardly possible that he intended to say that in the same breed the male ought to be smaller than the female, because this is contrary to the practice of nature. In every description of land animal with which I am acquainted the males are of a larger size than the females. The attempt also to follow this advice would undoubtedly, in a few generations, so very much reduce the size both of males and females, as considerably to diminish their value. I can say, from my own experience, that some of the best-shaped animals which I have bred have been produced by following a contrary course. I prefer breeding from large females; but if I do breed from one which I think too small, I put to her the largest male of good shape that I possess. As one instance among several to prove that this course may be successful, the ox which I showed in the fourth class, at the last Smithfield show, and which obtained the prize in that class, was by the largest bull I have, from a cow so small, that I culled her after she had bred that one calf. It must be admitted that the theoretical reasoning which Mr. Chine adduces in support of this recommendation appears to be very conclusive; but, even in the restricted sense in which I understand it, there is some doubt whether it is practically correct. The most successful cross between two different breeds of cattle, of which I am aware, was the one between a Durham bull and a Galloway Scotch cow, made by Mr. Charles Colling. The produce from this cross sold for enormous prices at his sale, and at the present day a majority of the best short-horned cattle are descended from it. My opinion, then, the result of my own practical experience, is, that if a man considers the female animals which he possesses to be smaller than he wishes, he may safely put them to a male of large size, provided he is well-bred, of good quality, and is well-shaped. But I am bound to add, that I know, in giving this opinion, I differ from the most skilful and successful breeders with whom I am acquainted.

It follows from the above observations, if they are correct, that the first and most indispensable object which all breeders must try to obtain, whatever may be the sort of animals they wish to have, whatever may be the shape or size they prefer, is that the male animal which they select shall possess a strong and healthy constitution. This is absolutely essential; but it is also most conducive to their success that they shall, after due consideration, make up their minds as to the qualities which they wish their stock to possess; that, having made this decision, they shall steadily pursue

the object they have in view, and endeavour to select such males as shall be likely to get offspring possessing these qualities; that they shall carefully and candidly examine the females from which they intend to breed, observe the faults in shape or quality which prevail among them, and select males who shall possess corresponding perfections. That the safest mode of ascertaining what are likely to be the qualities of the produce from a male in future is, where there is the opportunity, to see what are the qualities of the offspring already produced from them; then, the next to this is, to observe what are the qualities of the family to which he belongs; and that in the case of not having the opportunity of making use of either of these guides, they may assume that it is probable that the qualities of the individual himself, which in all cases ought to be attended to, will, if he is well-bred, descend to his offspring.

It has already been said that there are two classes among the farmers who breed cattle and sheep; the one, of those who breed bulls or rams, and the other, of those who breed oxen or wethers for the purpose of grazing only: the above observations are intended to apply to both. But much more attention ought to be paid by the first of these classes to the selection of the animals from which they breed than is absolutely necessary in the other. This is essential to their own interest, because a male animal very often shows faults in his shape, which, if he had been castrated, would not have appeared. It frequently, therefore, happens that the produce from a bull or a ram may prove excellent cattle or sheep for grazing purposes only, but may be totally unfit to be kept as the sires of future stock. Their duty, also, to those who hire or buy from them imposes upon them the obligation to pay the strictest and most minute attention to the qualities of their male animals; more particularly, they are bound not to offer to their customers any one, of the health of which they have any reason whatever to doubt, whether this doubt arises from any weakness of constitution, which may have appeared in the individual himself, or whether it arises from their knowledge of the family from which he is descended. They are bound, also, not to keep as males any animals who are not perfectly well-bred. It does not follow from this, that a long pedigree is in all cases necessary, although it is generally desirable; but it sometimes happens that a female, of whose pedigree the owner is ignorant, will have produced offspring which have all possessed extraordinary merit, and which have proved themselves good breeders also: a male descended from such a female may be considered perfectly well-bred on her side; and will, very possibly, prove a better sire than many whose pedigree on paper is much longer.

In paying this minute attention to their occupation, the breeders of male animals have some advantages not possessed by others;

they have generally the opportunity of knowing accurately what are the characteristics of the families of the animals from which they breed, an opportunity not possessed by those who breed only for grazing purposes. In order to make a proper use of this advantage, they ought to keep accurate pedigrees of their cattle and of their sheep, and as far as possible, when they put the males and females together, recollect what have been the respective qualities of the ancestors of each. They have also the opportunity, by using a male cautiously at an early age, of knowing, by experiment, whether the stock produced from him is good or bad, before they run the risk of injuring their stock materially by using him largely. This may be ascertained with sufficient accuracy, when the produce are very young; for an experienced breeder can judge with tolerable certainty what will be the shape of a calf or a lamb when it grows up by seeing it soon after it is born, and before it has begun to lay on fat. Nor is it necessary to see many of the produce for the purpose of deciding what its general characteristics will probably be. I admit that in saying this I am speaking more from my experience as a breeder of cattle, than a breeder of sheep but I believe the same observations will apply to both. It is certain, however, that seeing four or five calves from a bull ought to be a sufficient guide to the breeder as to whether he will be valuable as a sire or not. Unless there is a family likeness which generally pervades through the produce from a bull, although he may be valuable as the sire of oxen, it will not be safe to use him as the sire of bulls. The seeing, therefore, four or five calves will prove to the breeder whether there is such a family likeness among them, and whether it exhibits itself in such qualities as indicate that when they grow up they will be valuable animals.

There is one failing to which all breeders are liable, but to which the breeder of male animals, from the greater interest attached to his occupation, is more peculiarly liable, and against which he ought most carefully to guard himself; this is, too great a partiality for animals bred by himself. In order to guard against this, he ought to occupy himself more in looking for faults than in discovering merits in his stock, he ought to listen to every criticism he hears made upon them, even by those whose judgment he does not hold in high estimation—not, of course, with the view of being satisfied at once that the criticism is correct, but with the view of satisfying himself, by accurate and candid examination, whether it is so or not; and he ought frequently to see the stock belonging to other breeders, and fairly compare its merits with those of his own.

I think it most probable that in the foregoing observations nothing will be found which will give new and useful information to practical farmers; but I have been induced to submit them to the English Agricultural Society, because I conceive that one of

the great objects of that society is the diffusion of knowledge connected with every branch of farming. The best way in which it can be enabled to effect this object, is by those of its members who have paid attention to any of the divisions of farming operations communicating to the Society the results of their practice and experience. It will then be for the Society to circulate, by any means in their power, such of these communications as it shall appear to them are likely to be useful to those engaged in the cultivation of the land. With this view I place this paper at their disposal.

III.—*On the Deanston frequent Drain System, as distinguished from and compared with the Furrow-Draining and Deep-Ploughing of the Midland Counties of England.* In a Letter to the Editor. By the Right Hon. Sir JAMES GRAHAM, Bart., M.P., F.R.S., &c. Read Feb. 20, 1839.

SIR,

A recent inquiry addressed to me by Lord Spencer relative to the " Deanston frequent Drain System," induces me to believe that I may render some service to agriculture, if I am so fortunate as to direct the attention of your readers to this important subject at this particular time.

The great object of our quarterly publication is, as I conceive, the establishment of an authentic record of practical experiments; and by multiplying facts and proofs of this description agriculture will be treated as a science, and will advance, and the Transactions of our Society will become the depository of useful information, verified by the name and the address of the several correspondents.

Mr. Smith, of Deanston, in the county of Perth, was examined as a witness before the Agricultural Committee in 1836. He gave a detailed account of his system of draining, which very much resembles the furrow-draining of the midland counties of England, except that at Deanston, stone being on the ground, the drains are made with stones and not with tiles; and at Deanston the cover of the drain is 22 inches below the surface; whereas in Leicestershire and Northamptonshire the top of the tile in the furrow is not so deeply laid. Mr. Smith, when his land is effectually drained, lays it down without a furrow; in the midland counties the furrow is carefully preserved.

Mr. Smith, after draining, for the first rotation at least, does not bring to the surface any of the subsoil; but by a plough of his own invention, which follows a common plough turning up the surface, he penetrates the subsoil to the depth of 20 inches, and

breaks and pulverizes the lower crust without bringing it to the top. This subsoil-plough, such as Mr. Smith has used, is a heavy implement, requiring the draught of four, six, or eight horses, according to the tenacity and strength of the substratum.

Mr. Smith contends that the subsoil, by being moved, becomes pervious both to air and moisture; that the efficacy of the drains is thus perfected and perpetuated; and that the character of the subsoil itself, when relieved from superfluous moisture, and open to atmospheric influence, is entirely changed; that it becomes mellow and friable; and after one rotation, or a lapse of five years, that it may be brought to the top, by deep ploughing, with safety and propriety, and be mixed with the surface-soil to great advantage.

In the midland counties of England, deep ploughing after furrow-draining has been the constant practice; but the use of six horses in a subsoil-plough is a novelty in Scotland. In England a portion of the subsoil is raised at once to the top: at Deanston the subsoil, though broken, is not so raised; and here the important question arises, When land is effectually underdrained, which is the right treatment of the subsoil? Will you bring a portion of it immediately to the surface by deep ploughing, or will you, with Mr. Smith, delay this operation for some years, until the subsoil shall have been mellowed, after having been broken and penetrated by the atmosphere?

The advantages of the wide circulation of agricultural knowledge of the multiplication of experiments, and of the interchange both of theory and practice between Scotland and England, will here develop themselves in the clearest light. Furrow-draining and deep-ploughing have been practised in England for half a century; yet the introduction of an analogous system into Scotland is regarded almost as a discovery. But in Scotland itself the greatest difference of opinion prevails on the question of turning up or only moving the subsoil after draining. Some of the greatest authorities in East Lothian differ from Mr. Smith, and lean to the English practice. In the first furrow for green crop after draining, by two ploughs following each other, which is equivalent to trench-ploughing, they go down to the depth of 12 or 14 inches, and bring up a certain quantity of virgin soil.

It is obvious that this difference of practice in the treatment of the subsoil involves a most important question, which can only be solved by accurate and multiplied experiments. The outlay of capital, which is common to both plans, consists in effectual under-draining; and no subsequent management, no fresh application of capital, can be of any avail, unless, on retentive soils or a substratum of clay, the water be quickly carried off. This I take to be an axiom undisputed in agriculture: but after effectual draining, when

the outlay has been incurred, the mode of treating the subsoil affects only production, and does not involve expenditure; and greater produce without additional outlay is the grand object of the practical farmer.

We have seen that in draining Mr. Smith uses stones, because he has them on the spot. Tiles are substituted in the midland counties of England, because stones cannot be obtained easily, and because in the clay districts tiles are cheaply and easily manufactured.

It has always appeared to me that skill in agriculture does not so much consist in the discovery of principles of universal application, as in the adaptation of acknowledged principles to local circumstances.

The peculiarities of soil and climate, what nature gives or nature withholds in each particular district, must be carefully considered and judiciously investigated, before any given experiment, though locally successful, can be pronounced to be generally useful or universally applicable. The neglect of this consideration has brought agricultural experiments into disrepute, on account of the heavy losses which they have occasioned. If the record now opened in these Transactions be faithfully kept, this evil will be averted; for I hope that each experiment detailed will be authenticated by the name of the party who makes it, and that every local circumstance of a peculiar character will be carefully particularized.

My attention having been thus directed to the various treatment of subsoils after under-draining, I tried an experiment, in the year 1838, on a field of about 8 acres of the poorest and wettest land. The surface soil is about 5 inches deep of black earth of a peaty quality: the subsoil is a weeping retentive clay with sand and rusty gravel intermixed. This clay goes down to the bottom of the drains, which are of tile, laid 30 inches deep, in every furrow.* This field is in a farm lately taken into my own hands, and was rented by the out-going tenant at 4*s.* 6*d.* an acre. It was in pasture of the coarsest description, overrun with rushes and other aquatic plants.

After draining, on one-half of this field, I used Mr. Smith's subsoil-plough; on the other half I trench-ploughed to the depth of 10 inches by two ploughs following in succession: in the first part not mixing with the surface any of the subsoil, in the last part commingling the surface and the subsoil in nearly equal proportions. The whole field was heavily but equally manured and planted with potatoes; and though the potato-crop, even on good land, in this

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* The size of the tiles used was 6 inches for the main drains, and 3 inches for the common drains. The tile-drains were laid 10 yards apart.

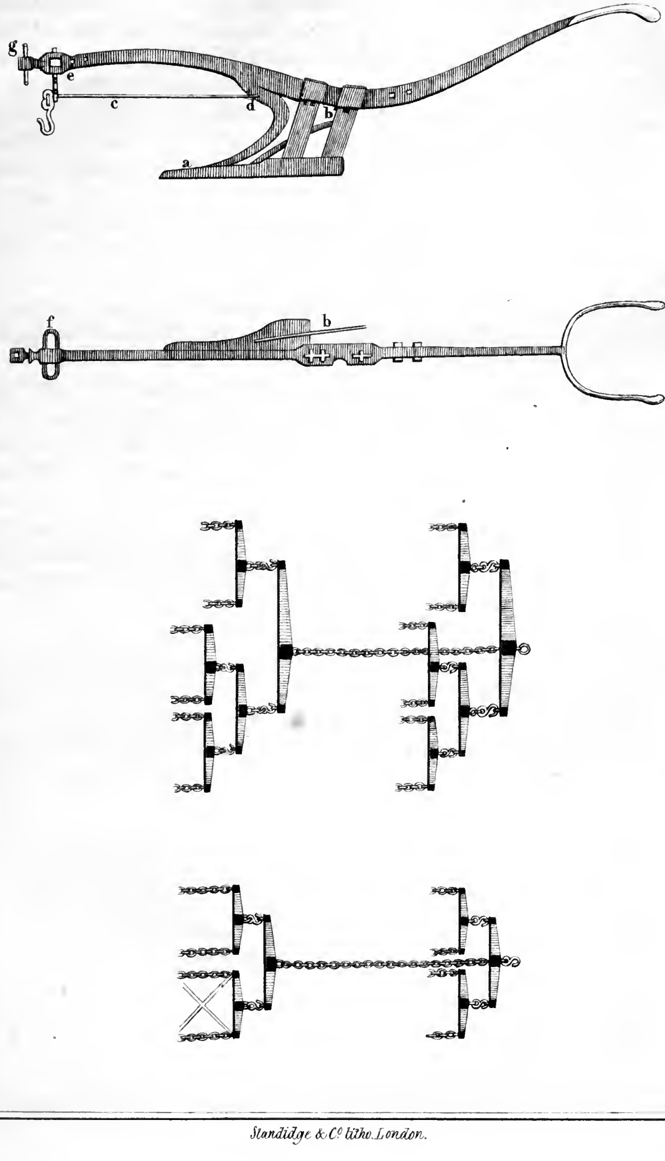
neighbourhood, was below an average, yet the crop in this field exceeded an average, and yielded about 12 tons per acre. The field is equally drained in every part. I filled up the tile-drains with porous materials, such as stones, moor-turf reversed, and tops of thinnings of young plantations, to the exclusion of the retentive clay which held the water. The crop of potatoes was so equal throughout the field, that I am unable to pronounce positively which part was the best; but I am inclined to give the preference to that portion where Mr. Smith's subsoil-plough was used. Since the potatoes were taken up the land has not been ploughed or ridged up, but remains perfectly flat; and I observe, where Mr. Smith's subsoil-plough was used, that no water whatever, notwithstanding the wetness of the season, has stood upon the land; where trench-ploughing was adopted, and a portion of the clay brought to the surface, after heavy falls of rain the water has stood for a time in hollow places; and here the land, in consequence, would seem to be rather soured. The field will be sown out this spring with oats and grass-seeds, and I shall watch with anxiety the future effect of the past different treatment.

In the mean time I have relet the farm: the outlay in draining and extra ploughing cost me £6. 18*s*. 4*d*. an acre;* but the field in question, which was valued at 4*s*. 6*d*. an acre to the out-going tenant, is rented by the in-coming tenant at 20*s*. an acre on a lease of 14 years.

On a small field of very retentive clay, of an hungry and bastard kind, intermixed with rusty gravel, I tried, six years ago, the experiment of trenching with the spade after close and careful draining; I buried the surface soil, which was poor and exhausted, and I brought the subsoil to the top from the depth of 18 inches. I limed this land and sowed it out with rape and grass seeds. It has been very unproductive ever since, and all my expenditure upon it, hitherto, has been thrown away; for, though dry, it bears no more grass than before the draining. I think, however, that the surface-soil is now mellowed by exposure to the atmosphere; and I am

	£.	s.	d.
* 70 roods of draining, cutting, laying the tiles, and upfilling, at 4d. per rood	1	3	4
1500 tiles per acre, at 30s. per thousand	2	5	0
Carriage of do. 6s. do.	0	9	0
Do. of turf, &c., for covering the tiles, 70 roods, and cutting do., at 6d. per rood, gives per acre	1	15	0
	5	12	4
Ploughing with the Deanston plough, with four horses	1	6	0
Cost per acre	£6	18	4

SUBSOIL PLOUGH



Standidge & Co. litho. London.

about to break up this field and to put it through a rotation, in the confident hope of increased production. I have also ordered a field of 20 acres, of dry and good land, cropped out by a bad tenant, to be treated with a view to this experiment on subsoils. The field lies in two ridges on the bank of the river Esk: the soil is alluvial deposit: on the lower ridge next to the river the surface is a fine loam of 12 inches deep, incumbent on a subsoil of sandy loam 16 inches deep. On the upper ridge the loam does not exceed 8 inches, but the subsoil is a good clay 13 inches deep: in the hands of tenants up to the present time, the depth of the furrow ploughed has never exceeded 6 inches. I have ordered the lower flat to be trench-ploughed to the depth of 14 inches, bringing the virgin loam to the top; I have ordered the upper flat to be stirred with Mr. Smith's subsoil-plough, thus breaking the lower crust, without changing the surface. The whole is to be manured equally with bone-dust, and a crop of turnips is to be taken.

I shall be happy, at a future time, to communicate the comparative result of this different treatment; and I trust I may be pardoned for my present intrusion, which arises from my anxiety to fix the attention of the farmer on this question of the treatment of subsoil, which by judicious management, I think, may add to the power of production without cost; especially when the surface by long and repeated cropping has been exhausted and has become comparatively sterile. At the commencement of our publication I could not omit an opportunity of endeavouring to use it for the legitimate purpose of inviting accurate experiment, with the view of circulating and extending agricultural knowledge.

I have the honour to be,
Sir,
Your faithful Servant,
J. R. G. Graham.

Netherby, 26th January, 1839.

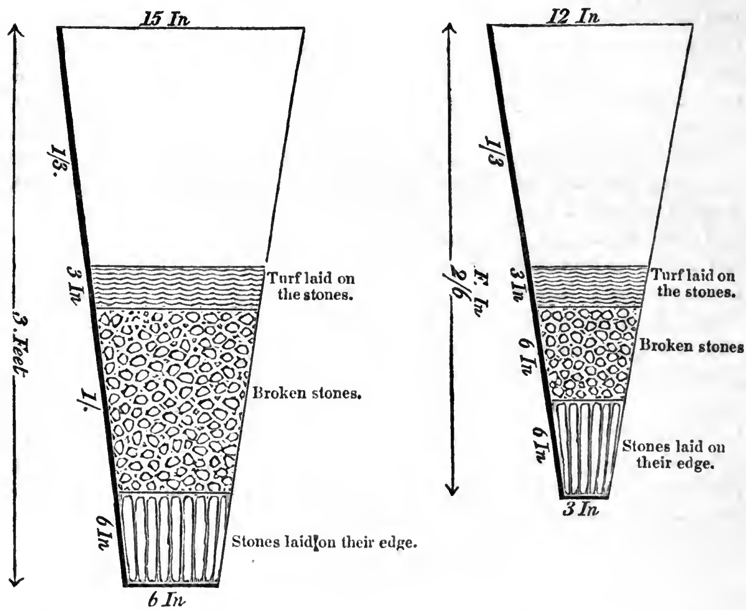
IV.—*Report of several Operations in Thorough-Draining and Subsoil-Ploughing, at Oakley Park.* From Mr. Richard White. Communicated by the Hon. Robert H. Clive, M.P. Read Feb. 27th, 1839.

Sir,

I beg leave to send you herewith a statement of the particulars of the extent of draining and subsoil-ploughing, together with the expenses attending the same, upon the farm in your own occupation. I consider it best to give it you in detail, that you may be

better able to judge of the progressive improvement that may take place under such a system: at the same time I beg leave to make a few observations as to the mode of draining and subsoiling, also to the state of the different fields previous to and since undergoing the process.

Main Drain. Smaller Drains.



The main or leading drains are cut 3 feet deep, 15 inches wide at the top, taper to 6 inches at the bottom, and filled up with stone from 15 to 18 inches. The smaller drains, leading into the main, are 2 feet 6 inches deep, 12 inches wide at the top, taper to 3 inches at the bottom, and filled with stone 13 inches, with turf upon the stone. The stone is first placed on edge, about 6 or 7 inches, and the remaining part covered with stone broken to $2\frac{1}{2}$ inches: a section of these drains is given—the drains are parallel to each other. The subsoil varies much; the price for cutting the whole, breaking the stones, and filling, has invariably been 1*d.* per yard: some part has worked better than others, and, upon the whole, I think the work cannot be done for less. With regard to the distance between the drains, in this part, the work must be put out according to circumstances, which requires much attention, as great expense might unnecessarily be incurred, or

the object fail. When the land is ready for the operation of the subsoil-plough, a man with a pair of horses turns out the first furrow from 10 to 12 inches wide; then follows the subsoil-plough to the depth of 14 inches, taking care not to stir the turf covering the stones in the drains; it is worked at right angles of the drains, and drawn by six horses, two and two abreast. The plough is drawn from an axletree, with double shafts and low wheels; the horses draw perfectly even, and by this mode it is no more than ordinary work.

The statement of the expenses given may appear to vary, but that is in the carting of the stone; some part was carried three-quarters of a mile, and in other parts the stone was got in the same field.

As far as crops have been obtained since commencing this system, I can say but little. The turnips, from No. 2, sown late in July, 1837, were small, and nearly all destroyed by the hard frost: the barley-crop, last year, was said to be much better than any ever seen on the farm before—it is estimated at upwards of 30 bushels (imperial) per acre.

The fields Nos. 1 and 3 were worked for and sown with turnips last year (1838), and upon the stiffest soil; they were very good on the lighter parts: the wire-worm did much injury to the crops. Upon the other fields no crops have yet been got; but one very material point has been obtained in a very satisfactory manner—that is, the whole of the six fields were, previous to the draining and subsoil-ploughing, in a state of high narrow ridges, with surface gutters; but now forming a flat surface, without furrows or gutters, and perfectly firm.

The whole has been executed upon Mr. Smith's system, and, if that system is strictly followed and adhered to, I am firmly of opinion that the introduction will tend to greater improvement in the cultivation of the soil than anything hitherto brought forward.

In the course of a year or two, I have no doubt it will be in my power to lay before you the most favourable result; and, as you have personally attended to the operation of the draining and subsoiling whilst in the country, you will be much better able to judge of the improvement. The draining for 17 acres is now going on, preparatory to subsoiling, which will be carried into effect in due time.

I have the honour to remain, Sir,

Your faithful and very obedient humble servant,

RICHARD WHITE.

Oakley Park, Feb. 22, 1839.

To the Hon. Robert Henry Clive, M.P.

No. of Acres.	No. of Yards cut.	Description, &c.	Amount of Expenses.		
A. R. P.			£.	s.	d.
10 1 29	8436	No. 1.—The subsoil is a stiff clay, and the drains are 15 feet apart.—Cutting open, Laying the Drains, Breaking the Stone, and Filling-in, at 1*d.* per yard.	35	3	0
		Getting 422 loads of Stone at the Quarry, at 6*d.* per load	10	11	0
		Carrying the above to Drains, ¾ of a mile—7 horses, 20 days, at 21*s.* per day	21	0	0
		Filling, 422 loads of Stone, at 1½*d.* per load . .	2	12	9
		Total £	69	6	9
		Expense per Acre .	6	18	6
		The above field was a two-years' ley, drained in Jan. 1837, ploughed and sown with oats, subsoiled after the oats; and turnips in 1838.			
11 2 5	7314	No. 2.—The subsoil varies much, part clay, loam, and part rocky; the drains are 21 feet apart. Cutting open, Breaking the Stone, Laying Drains, &c., at 1*d.* per yard	30	9	6
		Getting the Stone over different parts of the same Field, and wheeling to Drains, at ½*d.* per yard .	15	2	0
		Three Horses, carrying remainder of Stone to Drains, three days, at 10*s.* 6*d.* per day	1	11	6
		Total £	47	3	0
		Expense per Acre .	4	2	0
		The above, a two-years' old ley, drained in June, 1837, subsoiled and sown with turnips and barley, 1838.			
7 0 14	3866	No. 3.—Varies much in the subsoil, one part stiff clay and part rocky and gravel; the drains are 18 and 36 feet apart; the stone got in the field.—For getting the Stone, Cutting and Laying the Drains, Breaking the Stone, &c., 1½*d.* per yard .	24	5	9
		Carting 250 loads of Stone to Drains, 4 horses, 6 days, at 12*s.* per day	3	12	0
		Total £	27	17	9
		Expense per Acre .	4	0	0
		This piece was oats, after ley, 1837; drained in spring, 1838, subsoiled and turnips sown.			
14 1 30	7133	No. 4.—Varies much in subsoil: the drains are 20, 27, and 40 feet apart.—Getting Stone, Cutting and Laying Drains, Breaking and Filling-in, at 1½*d.* per yard	44	11	0
		Carting 450 loads of Stone, 5 horses, 14 days, at 15*s.* per day	10	10	0
		Total £	55	1	0
		Expense per Acre .	4	0	0
		This piece was drained in Spring, 1838, ley sown with oats; subsoiled in November, preparatory for turnips in 1839.			

No. of Acres.	No. of Yards cut.	Description, &c.	Amount of Expenses.
A. R. P.			£. s. d.
5 0 0	3166	No. 5.—The subsoil a stiff clay: the drains 18 feet apart.— Getting the Stone, Cutting the Drains, Breaking the Stone, and Filling-in, at $1\frac{1}{2}d.$ per yard	19 14 11
		Carting Stones to Drains, 4 horses, 5 days, at 12*s.* per day	3 0 0
		Total	£22 14 11
		Expense per Acre .	4 11 0
		This piece fallowed out of ley, after draining and subsoiling in Summer, 1838: now sown with wheat.	
10 3 37	7459	No. 6.— Clay loam, but varies: the drains are 18 and 27 feet apart.— Getting Stone, Cutting and Laying Drains, Breaking Stone, and Filling-in, at $1\frac{1}{4}d.$ per yard	46 12 4
		Carting 466 loads of Stone, 19 days, with 7 horses, at 21*s.* per day	19 19 0
		Total	£66 11 4
		Expense per Acre .	6 0 0
		This piece was a ley, drained and subsoiled, fallowed and sown with wheat.	

ABSTRACT.

A. R. P.	YARDS.		£. s. d.
10 1 29	8436	Field, No. 1	69 6 9
11 2 5	7314	„ No. 2	47 3 0
7 0 14	3866	„ No. 3	27 17 9
14 1 30	7133	„ No. 4	55 1 0
5 0 0	3166	„ No. 5	22 14 11
10 3 37	7459	„ No. 6	66 11 4
59 1 35	37,374	Total Expense	£288 14 9

Average Expense per Acre . . £4. 17*s.* 0*d.*

V.—*An Account of the Application of the Subsoil-Plough to a Dry Soil at Heckfield, Hants.* By CHARLES SHAW LEFEVRE, Esq., M.P. Read Feb. 13th, 1839.

SIR,

Although the effects of the subsoil-plough in the improvement of wet and tenacious soils are well known, I am not aware that any one has as yet applied this valuable implement to soils of a totally opposite character: I will therefore state to you, as briefly as possible, the result of an experiment which I have tried upon land in my own occupation, which has been attended with decided success.

I have a field of 6 acres, which for many years has been scarcely worth cultivating. It consists of a light sandy soil, from 5 to 7 inches in depth, covering a stratum of hard gravel. This stratum varies in depth from 8 to 12 inches; and below it there is a yellow sand, with a very slight admixture of loam.

There are no springs in the field; but, in wet seasons, on those spots where the surface of the field is uneven, the water is retained in pools until it has evaporated. In other parts of the field the same passes off immediately without being retained or absorbed by the subsoil; and, consequently, in dry seasons the crop is invariably parched and burnt up.

In the course of the session of 1836 I had an opportunity of hearing the interesting evidence of Mr. Smith, of Deanston, before the Agricultural Committee in the House of Commons, and it then occurred to me to apply the subsoil-plough, which had worked such wonders in a clay-soil, to a dry burning gravel.

The effect of my experiment will be best explained by a short statement of the produce of the field, for a series of years, up to the present period:—

Year.	Crop.	Produce per Acre.
In 1832	Oats	4 sacks.
1833	Turnips	Not quite 2 tons.
1834	Barley	Not quite 4 sacks.
1835	Clover	2 tons on the whole field.
1836	Wheat	3 sacks.

In the autumn of 1836 it was ploughed with the subsoil-plough, at a cost of 30*s*. per acre.

1837	Turnips	8 tons per acre.
1838	Barley	10 sacks per acre.

In other respects the land received the same treatment during the whole of this time. There is at present a fine plant of Dutch clover in the ground, which promises to prove an excellent crop.

I am, Sir, your obedient servant,

CHARLES SHAW LEFEVRE.

VI.—*An Account of an Experiment on the relative Values of several Varieties of Wheat.* By JOHN MORTON, Esq., of Chester Hill, near Stroud. Read Feb. 20th, 1839.

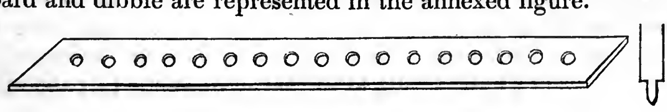
THE profits of farming, whether the land be pasture or arable, and the tenant be a feeder of stock or a tiller of the ground, may be increased in two ways.

The stock-farmer knows very well that the return he obtains from his cattle depends, not only on the kind of food given to them, and the manner in which it is supplied, but also on the feeding qualities of the breed to which they belong; and he increases his chance of profit as much when, on purchasing from the breeder, he selects with judgment, as when he adopts an improved mode of feeding.

The intelligent farmer of arable land, again, expects a greater crop, the more he has been able to improve the texture of the soil, and the better the nature and state of the manure which it contains. He expects it, because he knows that it depends on the nature of the food given to the plants, and the manner in which they are provided with a constant supply of it. The crop does not, however, depend only on this: for as two beasts fed in exactly the same manner may not be equally profitable, owing to a difference between them regarding the quantity and quality of the meat they afford, so two different kinds of wheat, though sown on land precisely similar, and in equally good condition, may give unequal returns, owing to a difference between them regarding the quantity and quality of the flour they afford.

Hence the importance, too often overlooked by farmers, not only of preparing the land for the crop in a good and sufficient manner, but also of selecting that kind of seed which experience has pointed out as being most valuable and productive.

It was with a view, not only of ascertaining the relative value, hardiness, and other properties of several of the most commonly-planted wheats, but also of effecting an improvement in the best of them, that the following experiment was commenced on the 1st of November, 1837. To insure accuracy in the results, it was necessary that the seeds of each variety should be planted so as to have them all at equal distances. To effect this, two boards were used, each 6 inches wide, 9 feet long, and half an inch thick. Along the centre of each board was a row of holes, 3 inches apart and 1 inch in diameter. A dibble was made to fit into the holes, having a shoulder at the distance of 2½ inches from the point. The board and dibble are represented in the annexed figure.



When the board was placed on the ground, and the dibble put through each hole in succession, a series of holes was thus made, 2 inches deep, and three inches apart from centre to centre.

After this had been done through the first board, the second, which was touching it, and parallel to it, was served in the same way; and then the first was taken up, and placed on the other side of the second. By proceeding thus, the whole ground was finished, and then one grain of wheat was dropped into each hole. The rows were thus exactly 6 inches apart, and the grains in the rows were 3 inches from one another. The regularity with which the planting was performed was thus mathematically accurate. The ground planted lies on the lower edge of the great oolite formation, and the soil is a stone brash, about 10 inches in thickness. Crops of potatoes had been taken off it for a succession of eight years; and it had been manured every alternate year, with a compost of equal bulks of stable-dung and earth, at the rate of about 20 cubic yards per acre. It was 67 feet in length; and 3 rows of each variety of wheat were planted, except the first and last numbers, of which there were 4 rows. The outer row of each of these, however, was not taken into account, because their roots had a much greater extent of ground for their growth than the others, whose roots touched one another all round. The end plants of each row were also rejected for the same reason. 66 feet in length of ground were thus taken up, and 3 rows of each variety occupied in width 1½ foot: the ground occupied by each variety was thus 99 square feet, the 440th part of an acre.

(In the opposite page is a tabular account of this experiment.)

Although the tabular form in which this experiment is detailed explains itself by the headings of each column, yet it is considered necessary to give a somewhat fuller account of it. The seed from which the first 10 varieties were raised was carefully selected from specimens of each obtained in the ear. The others were from samples, and here, also, the greatest care was taken that the seed from which each was raised should be the best and plumpest that could be obtained.

The first five columns need no explanation beyond what is given at the head of each: the sixth shows the number of grains lost from casualties. If the frost had been the only agent in the destruction of so many of the seeds, this column might have been considered as a very accurate index of the relative hardiness of each variety. This, however, is not the case, for the havoc which the birds made must also be taken into account. It was thought at the time that more injury was sustained, from the latter cause, by those varieties planted on the 21st, than by any of the others; but this does not appear to have been the case, for, if the great loss sustained by these had been wholly owing to the havoc committed by the birds,

When planted.	No.	Name of Wheat.	Whence obtained.	No. of seeds planted.	Loss of seeds from birds, frost, &c.	Produce of 99 square ft. Plants or roots.	Produce of 99 square ft. Heads of grain.	No. of ears in one square foot.	Average No. of heads per root.	Weight of grain produced from 99 square feet.	Weight of wheat per acre.	No. of bushels per acre, at 64 lbs. per bushel.	Length of straw.	Weight of straw produced from 99 square feet.	Weight of straw per acre.	Weight of roots with 2 in. of stem.	Weight of roots per acre.
										lbs.	Tons. cwt. qrs. lbs.		ft. in.	lbs.	Tons. cwt. qrs. lbs.	lbs.	Tons. cwt. qrs. lbs.
Nov. 15	1	Old red Lammas .	Pusey, Berks . .	792	387	405	2463	25	6	6	1 3 2 8	41	5 8	$16\frac{1}{2}$	3 5 2 24	5	0 19 2 6
..	2	Golden drop . .	.. ..	792	291	501	2542	25	5	$6\frac{3}{4}$	1 6 2 8	$46\frac{3}{4}$	5 6	$15\frac{1}{4}$	3 0 0 3	$5\frac{1}{4}$	1 0 2 14
..	3	Ten rowed prolific	Hareby, Lincolnsh.	792	391	401	1935	19	$3\frac{2}{5}$	$4\frac{1}{2}$	0 16 2 16	27	5 5	$12\frac{3}{4}$	2 10 0 10	5	0 19 2 6
..	4	Hunter's . . .	Leek, Lincolnshire	792	273	519	2028	20	$4\frac{1}{5}$	$4\frac{1}{2}$	0 16 2 16	27	5 6	$12\frac{3}{4}$	2 12 0 10	5	0 19 2 6
..	5	Thick-set Suffolk .	Lyford, Berks .	792	120	672	3039	30	$4\frac{1}{2}$	$10\frac{1}{2}$	2 1 1 0	$72\frac{1}{4}$	5 8	$19\frac{1}{2}$	3 5 2 14	$7\frac{1}{2}$	1 9 1 24
..	6	Hickley's Prolific .	Old Buckingham, Norfolk	792	132	657	2886	29	$4\frac{1}{3}$	$10\frac{1}{6}$	1 19 3 3	$69\frac{1}{2}$	5 7	$16\frac{1}{2}$	3 5 2 24	$6\frac{3}{4}$	1 6 2 8
16	7	White Taunton .	Wallingford, Berks	792	305	487	2695	27	$5\frac{1}{4}$	6	1 3 1 20	$41\frac{1}{2}$	5 6	$15\frac{1}{4}$	3 0 0 0	$5\frac{1}{2}$	1 1 2 12
..	8	Silver drop . .	Lyford, Berks .	792	218	574	2582	26	$4\frac{1}{2}$	8	1 11 1 20	55	5 6	$18\frac{1}{2}$	3 12 2 12	6	1 3 2 8
..	9	Scotch white . .	.. ..	792	379	413	2386	24	$5\frac{3}{4}$	$6\frac{1}{4}$	1 4 2 6	43	5 9	$16\frac{1}{2}$	3 5 2 24	$5\frac{1}{2}$	1 1 2 12
..	10	Talavera . . .	Taunton . . .	792	434	358	1985	20	$5\frac{1}{2}$	$5\frac{1}{4}$	1 0 2 14	36	5 8	$14\frac{1}{2}$	2 16 3 14	$5\frac{1}{2}$	1 1 2 12
21	11	Smithers' Hereford white	Cirencester (Smith)	792	319	473	2529	25	$5\frac{1}{3}$	$9\frac{1}{2}$	1 17 1 8	$65\frac{1}{2}$	5 6	$17\frac{1}{2}$	3 8 3 20	5	0 19 2 0
..	12	A red wheat . .	.. ..	792	252	540	3453	35	$6\frac{2}{5}$	12	2 5 1 12	$82\frac{1}{2}$	5 0	22	4 7 0 2	9	1 15 2 6
..	13	Egyptian Cone .	.. ..	792	528	264	711	7	$2\frac{1}{3}$	$3\frac{3}{8}$	0 13 0 24	23	6 0	$8\frac{1}{4}$	1 11 2 2	3	0 11 3 4
..	14	Red straw Lammas	.. ..	792	510	282	2096	21	$7\frac{3}{5}$	$4\frac{1}{2}$	0 16 2 16	27	5 8	$14\frac{1}{2}$	2 16 3 4	5	0 19 2 6
..	15	Blue cone . . .	.. ..	792	264	528	1626	16	5	6	1 3 1 28	$41\frac{1}{2}$	6 0	$9\frac{3}{4}$	1 16 1 16	6	1 3 2 8
..	16	Red cone . . .	.. ..	792	456	336	2446	24	7	10	1 19 1 4	$68\frac{3}{4}$	5 3	$12\frac{1}{2}$	2 9 0 0	$4\frac{3}{4}$	0 18 2 10
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18

NOTE.—Specimens, in the straw, of each of the varieties mentioned in the Table were laid before the Society.

it is evident that the varieties marked Nos. 12 and 15 would not have been so slightly injured, while Nos. 11, 13, 14, and 16, suffered so severely. The figures in this column may, therefore, be said to indicate with tolerable accuracy the relative ability of each variety to withstand the effects of a severe and changeable winter, such as that during which the experiment was made.

The number of plants of each variety which came to perfection, is placed opposite the name of each in the seventh column. This was ascertained by pulling each as they respectively ripened, and counting the plants of each before proceeding to the others. In this way, by a simple subtraction, the numbers contained in the sixth column, also, were ascertained.

When all the plants of any variety had been pulled, the number of ears, also, belonging to them was counted, and the results are placed in the eighth column.

By dividing these by 99, the number of square feet which each variety occupied, we obtain the number of ears in each square foot; and this is placed opposite the name of each wheat, in the ninth column.

The average number of ears to each root, ascertained by dividing the number of ears by that of the roots, is placed in the tenth column. This column shows the degree in which each species possesses the important property of spreading and shooting out stems, or, as it is technically termed, of *tillering;* and it will be seen that they vary in this respect greatly.

After having been pulled and dried, the wheat was carefully rubbed out; and after the light and imperfect grains had been separated, the weight of the remainder was taken, and placed opposite each sort, in the eleventh column.

The thirteenth column contains the number of bushels per acre raised from each variety. As the quantity produced was so small, there was some difficulty in obtaining the particulars which this column contains.

The mode adopted was this. The average weight of several of the varieties was ascertained by weighing 8 pints of each, to be at the rate of 64 lbs. per bushel, some being rather more, and others less. The number of bushels were then obtained from the weight of wheat per acre, by dividing it by 64.

The weight of straw, which is placed in the fifteenth and sixteenth columns, was ascertained after the roots had been cut off, and after it had remained out sufficiently long to dry it perfectly.

After the earth had been removed from the roots, which had been cut off with about 2 inches of the stem, they were weighed, and the result placed in the seventeenth and eighteenth columns. The object of this was to ascertain the amount of vegetable matter left in the soil after the wheat crop has been removed, and the

result greatly exceeds any conception of it that had been previously entertained.

The inferences which, it is presumed, may be drawn from the above details, are the following :—

1st. With regard to the hardiness of the varieties, which, as we have already said, may, to a certain extent, be deduced from the particulars contained in the sixth column, that they may be placed in three classes. Nos. 5, 6, 8, 12, 15, 4, and 2, being the hardiest; Nos. 13, 14, 16, and 10, being the most delicate; and Nos. 1, 3, 7, 9, and 11, occupying an average station.

2nd. With regard to the property of *tillering,* of which we have already spoken, that Nos. 12, 14, 16, and 1, possess it in the greatest degree; that Nos. 3, 13, 4, 5, 6, 15, 8, and 2, possess it in the least; and that Nos. 7, 9, 10, and 11, hold a medium rank.

3rd. That with respect to the relative value of each variety mentioned in the table, No. 12 is undoubtedly the best of any, in productiveness, and in being sufficiently hardy; that No. 13 is as undoubtedly the worst of any, as will be seen by a reference to any of the columns; and that the others vary greatly, some possessing nearly three times the productiveness of others.

These 16 different sorts of wheat, with the exception of Nos. 13, 15, 16, which are bearded, are merely varieties of one species of the genus Triticum; and the circumstance of differences existing among them, some possessing three times the value of others, shows that any variety is capable of improvement. This, indeed, is shown by many other plants besides the wheat. The originals of the potato, the carrot, and the turnip, were comparatively insignificant and useless in their application as food, and it was only by careful and repeated cultivation that they were at length brought to their present condition, and made to hold such an important rank among the many nutritive plants cultivated for the food of man and beast. It is supposed then, and where it has been tried experience shows it to be a fact, that, by first ascertaining the best of many varieties of wheat, and planting the finest and plumpest seeds selected from the best sample that could be obtained of it, the last of a succession of crops, the first of which was raised in this manner, and all the others from seeds selected out of the produce of the preceding harvests, would, at length, afford a wheat of a more productive and valuable kind than has hitherto been used by the farmer. The experiment here detailed is, then, merely the *first step* in the process—it merely points out the best of the varieties which were tried. The improvement of these by repeated cultivation still remains to be effected.

During the growth of the wheat, a journal was kept, an extract from which is given here, as it refers to an insect which was ob-

served after the blossoming of the plants, and to which the destruction of many of the seeds was owing.

Observations of this kind might be easily and generally made, and they would be useful as information regarding the nature and habits of the insects which attack wheat; and answers to the how? when? and where? on the subject, which would thus be obtained, afford the only guide to the invention of means for their destruction.

1838. EXTRACT FROM JOURNAL.

July 5th.—All the wheat is in blossom, except Nos. 13 and 15.

14th.—Very rainy and windy weather. Whether will this be found to injure or improve the quality of the grain?

16th.—Since the rain of the 14th, an orange-coloured substance, like rust, has been observed in the seed-vessels of some of the ears, as if the rain had got in and rotted the pollen. A very small fly has been observed about the ears in the evening. Many of the ears are filling rapidly, some are already full, and others are only in blossom.

19th.—In the ears of wheat, which were before-mentioned as having abortive grains, owing, as was thought, to the pollen having been rotted by the rain, I now find small orange-coloured grubs, about the tenth of an inch long, doubtless the offspring of the small fly observed about a week ago.

Aug. 4th.—All these grubs have disappeared.

27th.—Nos. 4, 10, and 11, are ripe and pulled.

28th.—Nos. 3, 5, and 6, are ripe and pulled.

29th.—Nos. 7, 8, and 9, are ripe and pulled.

30th.—Nos. 2, 12, and 16, are ripe and pulled.

Sept. 1st.—Nos. 1 and 14 are ripe and pulled.

2nd.—Nos. 13 and 15 are ripe and pulled.

The account of this experiment is thus finished, and there now remains but to state what will have already occurred to the reader, especially if he be apractical man, that it is not one nor many experiments, if conducted on a small scale, which will accurately determine the point this tends to ascertain.

The farmer himself must first be convinced of its importance, and the observations and experiments on this subject, which, if he be actuated by no higher motive, self-interest will then urge him to prosecute with diligence, will ultimately, no doubt, be crowned with success.

JOHN MORTON.

To the Secretary of the English Agricultural Society.

VII.—*On the Employment of Gas-Water as a Manure.* In a Letter to the Secretary, by John Paynter, Esq. Read Feb. 1839.

Sir,

Observing that you invite communications on experiments in agriculture, I take the liberty of sending you the result of one with gas-water—the water in which the street-gas has been cleansed. Having often thought that the alkali therein contained must be favourable to vegetation, I was induced, a few years ago, to try it on a piece of barley-land. A quarter of an acre was taken in the middle of a field, of rather close soil, in a granite district. The land was of average quality. The gas-water was distributed over the quarter-acre by a contrivance resembling that of a common watering-cart, and at the rate of 400 gallons to the acre, about a week before seed-time. The rest of the field was manured in the usual way.

The difference, both in colour and vigour, of the barley-plant was so strikingly in favour of the part manured by gas-water, that persons passing within view of the field almost invariably came to inquire about the cause. The yield also was superior, as well as the after-pasture, the field having been laid down with the barley.

The experiment was tried on the farm of Boslivin, about seven miles from Penzance. My distance from a gas-work has prevented me from following up the subject since: but I feel convinced that this water, so often complained of as a common nuisance, might be most profitably employed both in agriculture and horticulture. It might be poured on muck-heaps, where it would probably destroy grubs, &c., in addition to its fertilizing properties.

I am, Sir, your most obedient servant,

John Paynter.

Boskenna, Jan. 9th, 1839.

Note by H. Handley, Esq., M.P.

In confirmation of the foregoing letter, it may be observed that in many parts of the country, where gas-works are established, the refuse has recently become an object of interest to the agriculturist, as containing many of the essentials of the most effective manures. The refuse lime, which was formerly an inconvenience to the gas manufacturers, and was carted away as valueless rubbish, is now contracted for by neighbouring farmers (in an instance, within my own knowledge, at 7*s.* 6*d.* per chaldron), and applied either in compost or in a direct form to the land; where, in addition to the

usual operation of lime, it is said to furnish a protection against many of the noxious grubs and insects.

It is further probable that the ammoniacal liquor which abounds in gas-works, and which, when formerly allowed to run waste into the Thames, was said to destroy the fish, and prejudice the quality of the river-water for human consumption, and which is still thrown away throughout the country, except at a few works where they manufacture volatile ammonia, will, ere long, be extensively used as a manure, either through the intervention of the water-cart, or by the process of saturating and decomposing soil or vegetable matter. A very satisfactory illustration, on a small scale, has recently been submitted to the English Agricultural Society by the intelligent curator of the Polytechnic Gallery, Mr. Pain. He put into a vessel some leaves of trees, saw-dust, chopped straw, and bran, to which he applied ammonia, and closed it up. In about three weeks the whole was reduced to a slimy mass: he then stirred it and added a little more ammonia; and when submitted to the Society it was reduced to a black mass of vegetable mould, strongly impregnated with volatile salts, and in comminuted particles similar to surface peat-mould.

I have reason to believe that, in an experiment on tanners' bark, now in progress in my neighbourhood, the results will be satisfactory. When applied in its liquid form to grass-land, like salt, it apparently destroys the plant, but the spot is distinguished by increased verdure the succeeding year.

VIII.—*An Essay on the simplest and easiest Mode of Analysing Soils: to which the Prize of twenty pounds was awarded in December,* 1838. By the Rev. W. L. Rham, A.M., Vicar of Winkfield, Berks.

It is presumed that the object of the English Agricultural Society, in offering a prize for the best account of the cheapest and simplest mode of analysing soils, is to encourage farmers unacquainted with chemistry to make experiments on soils of known fertility, comparing them with others, in order to discover the circumstances which chiefly influence fertility, and the means by which less fertile soils may be improved.

The writer of the following Essay has no expectation that the little light which his experience enables him to throw on this subject should be thought worthy of a prize, even if no better mode of analysing soils should be offered by men fully acquainted with all the mysteries of chemistry. But as it may furnish hints to those who are interested in the progress of scientific agriculture, he ventures to describe a very simple mode of analysing soils, which he has found useful in practice, if not so absolutely perfect as those which are recommended by chemical writers.

Every practical agriculturist will allow that, besides climate, exposure, and other local circumstances, the fertility of a field depends more on the texture and division of the component parts of the soil, and its consequent affinity to water, than on the absolute

proportions of the simple earths of which it is composed. Thus, a sandy or siliceous soil, of which the particles are extremely minute, readily diffused through water, and slowly deposited, approaches to the nature of a clay-loam, being retentive of water, and binding in drying. The hard particles of argillaceous or calcareous stones, on the other hand, according to their size, have qualities very analogous to siliceous gravel or sand, the chemical properties of the earths not coming into action, except by means of other chemical agents. But the organic portion of the soil, which arises from the decomposition of animal and vegetable substances, has the greatest influence on the fertility, by modifying the effects of sand or clay, and furnishing the real nutriment of plants by its action with light, heat, air, and moisture. It appears from this that the chief object, in a practical agricultural analysis of a soil, is to ascertain the relative size of the particles of which it is composed, their chemical nature, their affinity to moisture, and the quantity of organic matter intimately blended with the earths. Any adventitious substances which may influence the fertility ought to be detected, if possible; but, unless these are in a sufficient quantity to produce a decided effect, they may in general be neglected.

It must be kept in mind that it is not a chemical nor a mineralogical analysis which is attempted to be described: it is a mere examination of the soil, which may be sufficient for the purposes of the farmer, and which the man of science may carry on to any extent and accuracy: we will only carry it so far as can be followed by any man of common information, however deficient in chemical knowledge.

We proceed to the description of the process we recommend. The soil to be examined must be taken a few inches under the surface, and in different parts of a field. If there appears much uniformity, the portions may be mixed, in order to have the average quality of the soil: should there be a visible difference between one portion and another, which is often the case, each may be analysed separately.

A portion of the earth to be analysed is dried in the sun or near a fire, until it feels quite dry in the hand. It is then reduced to powder by the fingers, or by rolling it on a deal board with a wooden roller, so as to separate the particles, but not to grind them: any small stones above the size of a pea must be taken out. If these form a considerable part of the soil, their proportion must be ascertained by weight; their nature and quality may be afterwards examined. This being a very simple operation, and obvious to the sight, need not be described. Where the stones and pebbles are evidently accidental, they may be overlooked, as having little influence on the fertility. The dry earth, cleared

from stones, should be accurately weighed; and it is convenient to take some determined quantity of grains, as 1000, 500, or 250, according to the accuracy of the instruments at hand. This portion should be put into a shallow earthen or metal vessel, and heated over the fire, or a lamp for about ten minutes, stirring it with a chip of dry wood: the heat should not be so great as to discolour the wood. It may then be allowed to cool, and be weighed again; the loss of weight indicates the water which remained uncombined after the soil appeared quite dry. This is the first thing to be noted.

The power of retaining water, without any external appearance of moisture, is greatest in humus, next in clay, both of which readily absorb it from the atmosphere; carbonate of lime does so in a less degree, and siliceous sand least of all. This moisture occupies the pores of the soil, and is very different from the water which is combined with clay as a part of its substance, and to which it owes its ductility: for when this last is expelled by a great heat the clay loses its quality, and approaches to the nature of sand. Pounded brick will not bind with water; and porcelain reduced to a fine powder has all the properties of siliceous sand in the soil. The finer the division of the particles of the soil, the greater will be its power of absorbing and retaining water; but in a soil where clay greatly predominates the lumps sometimes become so hard and baked by the sun that the moisture cannot penetrate, and in this case the power of absorption is much diminished. Hence loams in which there is a good proportion of humus have a greater power of absorption than the pure earths. Taking all circumstances into consideration, it will be found that the soils which most readily absorb moisture are also the most fertile, and therefore it is important to ascertain their power of absorption.

This can be found by comparison. Equal portions of different soils, dried as before, are placed in the opposite scales of a good balance, and left exposed for some time to a moist atmosphere. That which preponderates has the greatest power of absorption; the degree is measured by the difference of the acquired weights.

Another important circumstance is the specific gravity of a soil. The different earths have very different specific gravities; and humus being lighter than any mineral earth, the lightness of the soil is a sure indication of its richness, excepting where this lightness is occasioned by an excess of undecomposed vegetable matter, or peat. Humus, when nearly pure, has a specific gravity varying from 1.2 to 1.5; fine porcelain clay, 2; chalk, about 2.3; siliceous sand from 2.5 to 2 7: mixed soils have specific gravities varying according to the proportions of their component parts. Those in which clay, chalk, and humus

abound, and which are generally the most fertile, are the lightest. The sandy soils are heavier, and the more so if they contain oxydes of iron or of other metals; and it is well known that the ferruginous sands are the most barren. The common expression of *light,* when applied to a sandy soil, has no reference to its specific gravity, but merely to the force required to plough it. No carrier would say that a loose sandy road was a light one.

The easiest and readiest method of determining the specific gravity of earth, or any substance which is of a loose texture, is that described by Dr. Ure in his Philosophy of Manufactures, (page 97), as employed by him to ascertain the specific gravities of cotton, wool, silk, and flax. It is as follows:—Take a narrow-necked phial capable of holding four or five ounces of water; mark a line round the middle of the neck with the point of a diamond or a file; fill the phial up to the mark with river or rain water, and poize it with sand or any other substance in a scale; then put 1000 grains weight in the same scale with the phial, and pour out water till the equilibrium is restored. In the vacant space, which is evidently equal to the bulk of 1000 grains of water, introduce the soil till the water rises to the mark in the neck. Then put into the opposite scale grain weights sufficient to restore the equilibrium. The number of grains required for this purpose will denote the specific gravity of the soil compared to water as 1000. Suppose, for example, that siliceous sand, which is 2.7 times denser than water, is poured into the vacant space, it will require 2.700 grains to fill the space occupied by the 1000 grains of water; and thus we have the specific gravity without any calculation. If instead of 1000 grains, we use only 500, or 250, the result will be the same, if we multiply the grains in the other scale by 2 or 4.

We will give a few examples of soils of which the specific gravity has been carefully determined.

A rich garden soil, which contained per cent.,

Clay	52.4
Siliceous Sand	36.5
Calcareous Sand	1.8
Carbonate of Lime	2.0
Humus	7.3

had a specific gravity of 2.332.

A good loam consisting of

Clay	51.2
Siliceous Sand	42.7
Calcareous Sand	0.4
Carbonate of Lime	2.3
Humus	3.4

had a specific gravity of 2.401.

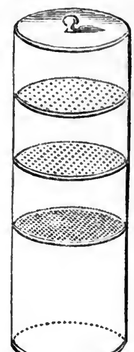
A porer soil, of which the component parts were

Silicious Sand	64.0
Clay	32.3
Calcareous Sand	1.2
Carbonate of Lime	1.2
Humus	1.3

had a specific gravity of 2.526.

These examples suffice to show that the specific gravity of a soil is some tolerable indication of its fertility. It cannot, however, be entirely relied upon in the absence of other proofs; for there may be many different mixtures of earths which will have the same specific gravity, although they may differ greatly in their fertility; but it will facilitate the analysis, and often detect mistakes in the process, if the result does not accord with the specific gravity found.

We proceed now to the analysis. The portion of soil which has been deprived of all its water, as described above, must be sifted through metallic sieves of different fineness; the first is made of a perforated tin plate, the holes of which are about one-twentieth of an inch in diameter. Whatever does not go through this is put by. The remainder is successively passed through two or three more sieves, increasing in fineness to the last, which is of the finest wire-cloth, having from 150 to 170 threads in an inch: whatever passes through this is an impalpable powder. Thus we have already a division of the soil according to the size of its particles:—1st, the coarse grit left in the first sieve; 2nd, the finer grit in No. 2; 3rd, fine sand in No. 3; and 4th, impalpable powder, which has passed through the last sieve. To facilitate this part of the operation the sieves may be made so as to fit into one another, like the filterers in a coffee-biggin, the last fitting into a tin pot which will hold about a pint of water; a cover being made to fit on the top sieve, the instrument is complete. (See Fig.) Thus all the sifting may be done at once, without any loss. Any lumps which are not thoroughly pulverized must be broken. The coarser sand left in the sieve No. 1 must now be washed with pure water to detach any fine dust adhering to it; what runs through may be used to wash No. 2, in the same manner, and then may pass through No. 3 to the impalpable matter which passed through all the sieves. A sufficient quantity of water must be used to render the whole of this last nearly fluid. There will then be three different portions of the washed soil left in the sieves, and a portion of impalpable matter diffused through the water in the lower division



of the instrument. This last is the principal object of analysis, and that to which Sir Humphrey Davy usually confined his attention, merely noticing the proportion of coarser sand in the soil. It contains, no doubt, the great principle of fertility and nutrition; and the effect of the coarser parts may be considered as chiefly mechanical. But they may much affect the fertility of the finer parts, and are of the greatest importance to the soil in which they are blended: they consequently deserve a more minute examination, to which we will return. In the mean time our attention shall be directed to the composition of the finer earth in No. 4, which is mixed with water in a semi-fluid state. This is well shaken, and suddenly poured into a deep glass vessel, and allowed to settle for a few minutes, when the heavier earth, which is sand, will be deposited, and the lighter may be poured off suspended in the water. It requires some little practice to effect this at once, but a few trials will soon enable any one to do it. This operation may be repeated until all the sand, of which the particles are visible to the naked eye, is separated. The earth and water decanted out of this last vessel are now poured into a glass tube, 18 inches long (No. 1), the bore of which is less than an inch: one end is stopped with a cork fitted into it, and the other has a small lip for the convenience of pouring out the contents. In a short time there will be a further deposition of earth, which will be principally alumina. What remains suspended in the water over it is gently poured off into another similar tube (No. 2): this will contain nearly the whole of the humus, which will take some hours to be deposited in the form of a fine brown mud. The contents of the tube No. 1 may now have a little more water added to them; after being well shaken, the tube may be set upright, and left for half an hour to settle: what remains suspended in the water after this must be added to the humus in the tube No. 2. After some time this will also be deposited; and the clear water may be decanted off. The mud which remains is put on filtering-paper in a glass funnel, and, when all the water has drained from it, it is dried over the fire, and weighed. This is the most important portion of the soil.* The fine earths deposited in the

* The dark mud which is last deposited, and which we call humus, for want of a better name, contains no doubt a considerable portion of extremely fine earth, which may be detected by heating it red-hot in a crucible, until all the carbonaceous matter is burnt and converted into carbonic acid gas. This may be accelerated by throwing into the crucible small portions of nitrate of ammonia. The oxygen of the nitric acid will unite with the carbon, and the nitrogen and ammonia fly off in the form of gas, leaving no residuum but the mineral earths and salts. But the organic matter being destroyed by this operation, its quantity alone can be discovered. The vegetable matter, which gives the soil its fertility, all other circum-

tube No. 1 will consist of very fine particles of sand, clay, and perhaps carbonate of lime. The sand will appear deposited in the bottom of the tube. The clay may be easily diffused in the water above it by stirring it carefully with a small rod without reaching the sand. It may then be decanted off with the water into another tube (No. 3), and allowed to settle: this part of the operation may be carried to a great degree of perfection by great care, and by examining the results occasionally with a small microscope; but for all common practical purposes it is sufficient to separate the vegetable earth from the mineral, and the visible particles of sand from the finer.

The contents of No. 1, having been collected, as well as those of No. 3, are dried over the fire and accurately weighed. The same is done with the earths which remain on the sieves.

All the water in which the earths have been diffused and washed is collected and passed through filtering-paper, and then set over the fire in a common saucepan. It is boiled away gently until it is reduced to a small portion, which begins to look turbid. The complete evaporation is finished in an evaporating-dish, as slowly as possible, and the residue is the soluble matter contained in the soil. It will be sufficient to dry and weigh this, as its further analysis would require more skill and chemical knowledge than we suppose in the operator. Salts may be detected by the taste, or by the crystals formed in the evaporation; but, unless there is a decided saline taste, the whole may be considered as soluble humus, and the immediate fertility of the soil depends greatly on the quantity of it.

To recapitulate what has been obtained,—we shall have the coarse grit in sieve No. 1; the sand in Nos. 2 and 3; the fine earth separated in the tubes Nos. 1 and 3; the humus in tube No. 2 and on the filtering-paper; and the soluble parts in the evaporating-dish. All these substances must be well dried over the fire, as was done with the soil at first, and each separate part

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stances apart, and which appears in various forms, according to the degree of decomposition, it has undergone and the circumstances under which it has taken place, may be obtained by dissolving it in a caustic alkali, and precipitating it by means of an acid. The precipitate has been named *humic-acid*, or *ulmic-acid*, and has often been confounded with humus, or vegetable mould. It is no doubt a component part of humus; but it is not found pure and uncombined in the earth, as far as we know. The real humus is a very compound substance, and exists in so many forms, that the experiments, which have hitherto been made, have not much increased our knowledge of it. It would be worthy the labour of some of our greatest chemists to trace the progress of vegetable decomposition, under various circumstances, and to detect the regular change which takes place in the arrangement of the elementary component parts—carbon, oxygen, hydrogen, and occasionally nitrogen—as the living vegetable dies, and is gradually transformed into humus, when deposited in the earth.

accurately weighed. The sum of them ought to be equal to the original portion of soil subjected to analysis after the water was driven off; but there always is a loss, even with the most experienced analyser. This loss will be principally in the finer parts, which are dissipated in the operation.

But the analysis is not yet completed: we have separated the sand, clay, and humus; but there may be a portion of carbonate of lime, in the form of sand, or of finely-divided earth mixed with the other earths. To ascertain this, each portion, excepting the humus, is put into a separate cup, and a little muriatic acid, diluted with four times its weight of water, is poured on it. If there is any effervescence, it shows the presence of carbonate of lime; diluted acid is then added gradually, as long as the effervescence is renewed by the addition. When this ceases, and the water continues to have an acid taste, more pure water is added, and each portion separately filtered, dried, and weighed. The loss of weight in each gives the quantities of carbonate of lime dissolved by the muriatic acid, and which has passed with the water in the form of muriate of lime.* The different weights being now collected, the result of the operations may be set down.

There may be many mineral substances in the soil, which this mode of analysing will not detect; and some of these may materially affect the fertility. In most cases there will be something to indicate the presence of metals. Iron abounds in most soils: when the quantity is considerable it will be detected by pouring a decoction of gall-nuts into the water which has washed the earth; it will immediately become of a bluish dark colour. The other metals are not of frequent occurrence. Sulphate of lime or gypsum, and also magnesia, are found in some soils; but the separation of them can only be effected by those who are well-acquainted with chemistry: they fortunately occur very seldom, and the places where they are found are generally well known. For all practical purposes it is sufficient to ascertain the proportion of sand, clay, carbonate of lime, and humus which any soil contains.

Many soils which have been highly manured contain portions of undecomposed vegetable substances, and fibres of roots;

* It may be objected to this mode of ascertaining the carbonate of lime, that the muriatic acid will dissolve iron, and a portion, however small, of alumina, as well as carbonate of lime, and that the collecting the carbonic acid evolved is a more exact measure of the quantities of the carbonate. This may be admitted, but we repeat that we only propose a simple and easy analysis, which will approximate to the truth, and not by any means a perfect one. We hope some more perfect, and no less simple, analysis will be invented by those who are masters of the science of chemistry.

these will be found mixed with the coarser earths separated by the sifting: not being a part of the natural soil, they need not be taken into the account; but they may be separated by washing the earths, as they are much lighter, and will come over in the first decantations. They may be dried and weighed, and the quantity set down in the result, if it is desirable.

Some very barren sands, containing very little argillaceous earth or humus, may readily be known by the copious sandy deposit which they rapidly make when diffused through water. Good natural loams are not so easily judged of; but the preceding mode of analysis will in general detect their intrinsic value. When a soil contains peaty matter, it is easily discovered by the irregular black particles which are visible in it. Peat differs from humus only in being in a different state of decomposition, and containing a considerable portion of tannin; when acted upon by lime or alkalies, and brought into a state of greater decomposition, it is not to be distinguished from humus in its qualities.

The only instruments absolutely required for the foregoing analysis are, in the first place, two good balances, one capable of weighing a pound and turning with a grain, and one weighing two ounces and turning with the tenth part of a grain.* Next, the combination of sieves, which we have described, and which may easily be made by any tin-smith. But any sieves of the required fineness, whether of metal, horse-hair, or silk, provided they be of the proper texture, will answer the purpose for a trial. Some earthen or glass jugs, and two or three glass tubes, 18 inches long, open at both ends, which may be obtained at any glass-blower's, or chemist's, a glass-funnel, and some filtering paper will complete the apparatus. The only chemical substance indispensable to the analysis, is some muriatic acid, commonly called spirit of salt. A little test-paper to detect acids in the water with which the soil has been washed, and an infusion of gall-nuts to ascertain the presence of iron, may be useful. A small glass-phial will serve for the specific gravities. The whole of these instruments and materials may be procured for a very small sum. If the foregoing process is carefully followed, any person, however unaccustomed to chemical operations, will soon be enabled to satisfy himself as to the composition of any soil of which he desires to know the comparative value. He must not be disheartened by a few failures at first. However simple every operation may appear, it requires a little practice and much pa-

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* If there is a doubt of the accuracy of a balance, the best mode of weighing is to poise the substance to be weighed with fine sand, and then substitute weights for it, till the sand is poised again. If a certain portion is to be weighed, poise the given weight with sand; then remove the weight, and poise the sand with the substance to be weighed.

tience, if we would come to a very accurate result. Every portion must be dried to the same degree before it is weighed;—minute portions which adhere to the vessels, when dried, must be carefully collected by scraping, and brushing off with a feather;—pieces of filtering-paper and of linen must be weighed before they are used, that small portions of matter adhering to them may be ascertained by the increase of weight. By attending to these particulars it is surprising how nearly the whole original weight is accounted for in the summing up of the separate parts.

If this mechanical analysis should be thought lightly of by experienced chemists, let them only carefully analyse a portion of soil by this process, and then another by any more perfect mode, and compare the importance of the results, as regards practical agriculture. The object is to ascertain the productive powers of the soils; and, for this purpose, the separation of the different earths is sufficient, in the present imperfect state of our knowledge of the mysteries of vegetation.

The process which we have described, simple as it is, may yet be too tedious for the farmer who is desirous of speedily comparing different soils; and we will indicate a still simpler method of ascertaining, nearly, the composition of a soil, and a simple instrument by which it may be done. Take a glass tube, $\frac{3}{4}$ of an inch in internal diameter, and 3 feet long; fit a cork into one end, and set it upright; fill it half-full of pure water; take nearly as much water as has been poured into the tube, and mix with it the portion of soil which is to be examined, in quantity not more than will occupy 6 inches of the tube; pour the mixture rapidly into the tube, and let it stand in a corner of a room, or supported upright in any way. In half-an-hour it may be examined. The earths will have been deposited according to the size and specific gravity of their particles. The portion still suspended in the water may be allowed to settle; and there will appear in the tube layers of sand, clay, and humus, which may be measured by a scale, and thus the proportions nearly ascertained. When a farmer is about to hire a farm, of which the quality is not well known to him, he may be much assisted in his judgment by this simple experiment, if he has no time or opportunity for a more accurate analysis. For the glass tube may be substituted one of tin or zinc, 2 feet in length, with a piece of glass tube, a foot long, joined to it by means of a brass collar or ferule with a screw cut in it, which is cemented to the glass, and screws on the metal tube; and thus the instrument may be made more portable. When the water has been poured off, and the earths only remain, the cork may be taken out, and the contents pushed out on a plate, by means of a rod and a plug which exactly fits the internal diameter of the tube. They may thus be more particularly examined.

The result of various accurate analyses of soils shows that the most fertile are composed of nearly equal quantities of siliceous and argillaceous earths in various states of division, and a certain proportion of calcareous earth, and of humus in that state in which it attracts oxygen and becomes soluble, giving out at the same time some carbonic acid. No chemist has yet been able to imitate the process of nature in the formation of this substance; and the circumstances which are most favourable to it are not yet fully ascertained. Here is the proper field for the application of science and accurate chemical analysis.

As an example of an analysis may be useful to those who may desire to try the proposed method, we will add one actually made, under very unfavourable circumstances, and without any apparatus. The only instruments at hand were scales and weights of tolerable accuracy, three glasses, a foot long and $1\frac{1}{4}$ inch in diameter, belonging to French lamps, a tin coffee-strainer, a piece of fine gauze, and a very fine cambric pocket-handkerchief. A little muriatic acid was obtained at the apothecary's.

The soil to be analysed was taken from a piece of good arable land on the south side of the slope of the Jura mountains in Switzerland. Its specific gravity was taken as described before, and found to be 2.358 nearly. 500 grains of the dry soil were stirred in a pint of water, and set by in a basin.

To save time, 500 grains more of the same soil were weighed, after having been dried over the fire. It was well pulverised with the fingers, and sifted through the coffee-strainer, then through the gauze, and lastly through the cambric handkerchief. Some portion was left behind at each sifting. The two first portions were washed in the strainer and the gauze. The residue was sand of two different degrees of fineness, which, when dried, weighed, the coarser 24 grains, the next 20 grains. The earth and water which had passed through the strainer and the gauze were now strained through the cambric, and left some very fine sand behind, which, dried, weighed, and added to what had remained on the cambric when sifted in a dry state, weighed 180 grains. All that which had gone through the cambric was mixed with water in a jug and stirred about. The heavier earth subsided, and the lighter was poured into one of the lamp-glasses which had a cork fitted into it, and was placed upright. In about two minutes there was a deposit, and the lighter portion was poured into a similar glass, where it was left some time to settle. In this a slower deposition took place, and in about a quarter of an hour the muddy water was poured off into the third glass. The three glasses were placed upright, and left so till the next day. In the first glass was some very fine earth, apparently clay; in the second the same, but more muddy; and in the third nothing but thin mud.

The contents of No. 2 were divided between No. 1 and No. 3 by pouring off the muddy part into No. 3, after some of the pure water had been poured off, and the remaining earth into No. 1. They were then left to settle. As much water as appeared quite clear over the sediment was decanted off. The sediment was poured on a plate by taking the cork out of the tube, which was cleaned with a piece of fine linen, which had been carefully dried and accurately weighed. The plates were examined, and some of the lighter part, which floated on the least agitation, was poured from one plate to another, until it was thought that all the humus had been separated. Most of the water could now be poured off the earths, by inclining the plates gently, without any muddiness. It was, however, passed through a piece of filtering-paper which had been previously dried and weighed. The earth was slowly dried, by placing the plates on the hearth before a good fire, until they were quite dry, and so hot that they could not be easily held in the hand. The deposit left in the jug was poured on a plate, and a little muddy part, which was observed, was poured off with the water on another. This was again transferred, and the finer added to that which was in the second plate.

Collecting now all the separate portions, there were found,—

Of coarse sand	24 grains.
finer sand	20
very fine sand..................	180
clay deposited in the jug and first plate, dried...............	240
deposit in the second plate	24
—— on the filtering-paper......	$1\frac{1}{2}$
—— on the linen rag	$\frac{1}{2}$
	490

Leaving 10 grains to be accounted for.

Each portion, except the three last, was now put into a cup, and diluted muriatic acid poured over them; an effervescence appeared in all of them, which continued on the addition of diluted acid, and when the contents of the cups were stirred with a piece of tobacco-pipe. They were left till the next day, when all effervescence ceased, and the calcareous part seemed entirely dissolved; pure water was added to dissolve all the muriate of lime which had been formed. After some time, the clear liquor was poured off, and the remainder was strained through filtering-paper, and dried on plates before the fire. The earths were now found to weigh, respectively, 20, 17, 162, and 182.5 grains, having lost 4, 3, 18, and 57.5 grains of calcareous earth dissolved by the acid.

The soil and water which had been put by in a basin were

now repeatedly stirred and poured into a filterer, and more water was passed through the earth to wash out all the soluble matter. All the water was boiled down and evaporated, and left two grains of a substance which had the appearance of a gum with a little lime in it. Thus the loss was reduced to eight grains, a very small quantity, considering the means used in analysing the soil.

The corrected account therefore is as follows :—

Specific gravity, 2.358.

Siliceous sand ..	Coarse	20 grs.	199 grs.
	Finer	17 ,,	
	Very fine	162 ,,	
Calcareous sand	Coarse	4 ,,	25 ,,
	Finer	3 ,,	
	Very fine	18 ,,	
Impalpable earth	Clay...........		182.5
	Carb. of lime....		57.5
	Humus		26
Soluble matter			2
Loss			8
			500

Or, in round numbers—

40	per cent.	Sand,
36	,,	Clay,
17	,,	Calcareous earth,
5	,,	Vegetable earth, or humus,
0.5	,,	Soluble matter.

From the composition of this soil, it is evident that it is a most excellent loam, capable of producing, with good tillage and regular manuring, every kind of grain, artificial grasses, and roots commonly cultivated. The field from which the soil was taken was always considered to be of superior quality.

This example will suffice to enable any one to analyse any soil of which he desires to know the component parts, so far as they affect the general fertility. To ascertain minute portions of salts or metals, or any peculiar impregnation of the waters, must be left to practical chemists.

To those who may be inclined to try the analysis of soils it may be interesting to compare the results of their own experiments with some which have been obtained with great care. Thaër, in his very excellent work on rational husbandry, written in German and translated into French, has given a table in which different soils analysed by him are classed according to their comparative fertility, which is expressed in numbers, 100 being the most

fertile. This table is the result of very patient investigation, the natural fertility of each soil being ascertained by its average produce with common tillage and manuring. It is as follows:

No.	Clay.	Sand.	Carb. of Lime.	Humus.	Comparative Value.	
1	74	10	4	11½	100	Rich alluvial soils.
2	81	6	4	8½	98	
3	79	10	4	6½	96	
4	40	22	36	4	90	
5	14	49	10	27	..	The value of this could not be fixed, as it was grass-land; perhaps bog-earth.
6	20	67	3	10	78	Good wheat and barley-lands.
7	58	36	2	4	77	
8	56	30	12	2	75	
9	60	38	Very little carbonate of lime.	2	70	
10	48	50		2	65	
11	68	30		2	60	
12	38	60		2	60	Barley-land, not fit for wheat.
13	33	65		2	50	
14	28	70		2	40	
15	23½	75		1½	30	Poor sand, fit only for oats or buck-wheat.
16	18½	80		1½	20	

The specific gravity of these lands is not given.

IX.—*Account of the Improvements which have taken place in the Agriculture of Scotland since the formation of the Highland Society, &c. &c.: Essay to which the Society's Prize of fifty pounds was awarded.* By Mr. John Dudgeon, of Skylaw, near Kelso.

The influence which the patronage of the powerful and the rich exerts in the promotion of industry, independently of direct encouragement, is in no branch so conspicuous in its effects as in that of Agriculture. This seems to have been so long understood, and the importance of husbandry so universally admitted, that we read in the early history of all nations, celebrated for their advancement in civilization and the arts, the marked encouragement which agriculture received. The long duration of the Chinese empire, its extent, and population, and power, are justly attributed to the proud position given to agriculture, and the re-

spect bestowed by its emperors upon the plough, by condescending, personally, once a-year, in presence of the nobility and great officers of the empire, publicly to exhibit its properties and thus extend its use. In Persia a feast was yearly celebrated by the king, of which husbandmen were freely invited to partake at the table of majesty; and the great Persian prophet, Zoroaster, recommended the saint in the Magian religion to manifest his devotion by pursuing industriously the labours of the field. The Roman emperors, by their personal patronage, encouraged also the pursuit of husbandry, and this art was ever held by them in the highest estimation. Agriculture spread with the conquests of their arms, and, instead of their track being marked by the desolations which usually attend the march of the conqueror, the attention of the Roman captains being specially directed to the encouragement of the productions of the fields, the nations brought under the influence of Rome became early distinguished by a more advanced system of husbandry. There seems every reason to believe that Britain owed its first lessons in agriculture, as an art, to the Roman invasion. Besides the marks of extended cultivation which were left by the Roman soldiers, the very considerable quantities of grain exported from Britain during the sway of the Roman arms bear testimony to the fact, that the favour shown to the peaceful labours of the field by the conquerors, possessed a powerful influence in exciting the inhabitants to a more extended cultivation.

Subsequently, the Saxon Ruler of these isles being favourable also to the promotion of husbandry, agriculture still continued under them to maintain its influence among the people; but the introduction of the feudal system by the Norman conquest brought in unsettled times, and the proud and ambitious barons being more intent on distinction in a rude and cruel warfare, regarded with contempt a pursuit which accorded so little with their tastes, and which was rendered insecure by the internal feuds to which their more ignoble enterprises gave rise. Hence agriculture rapidly declined. A feudal kingdom has been rightly designated the encampment of a great army; and though the possession of land was the remuneration which the soldier received for his services, that possession was granted during pleasure, and so long only as the vassal could render sufficient military aid. To afford this service he was subject to be called away from his fields at the most important seasons, his superior being anxious only for military distinction, and, so far from patronizing, had no sympathy in the degraded occupation of husbandry. This sad state of matters prevailed during the lapse of many centuries, increased, perhaps, by the more systematic and serious dissensions of after-times. Until the return of quiet, and a more settled government, men

had no leisure to turn their regards to peaceful occupations, and hence the wars of the Roses and of the Usurpation had passed, ere we find agriculture beginning to command the general attention it so well deserved. Previous to this latter period, indeed, some valuable works upon agricultural subjects had been published, * but, from the causes already mentioned, they excited little general interest among that class whose influence enabled them to be of use in propagating the knowledge of the improvements recommended.

It was not, then, until the establishment of complete order, some time subsequent to the Revolution, that there appears to have been any material improvement in the ordinary practice of husbandry; though, no doubt, the extent of land devoted to agriculture must, from the growing amount of the exportation of corn during the early part of the eighteenth century, have been considerably increased. The comparative prevalence of domestic quiet now permitted those most directly interested in the improvement of the soil to turn their anxious thoughts to a subject so closely allied with their welfare, as well as the general prosperity of the community. Accordingly, in Scotland, in 1723, a number of landholders formed themselves into a society, under the denomination of "The Society of Improvers in the Knowledge of Agriculture in Scotland."

In this society we discover the first germ of the Highland and Agricultural Society of Scotland; and although from its limited numbers it did not accomplish much beyond the influence of its own members, yet to this patriotic body of gentlemen may be traced the introduction of some of those improvements, such as the cultivation of grasses and turnips, which, above all, have tended to raise the character of British agriculture. That the efforts of this society were not so generally extensive, and particularly that the example of its members was cautiously, and to a very limited extent, adopted by the tenantry, may in a great measure have been owing to the continued unsettled state of this northern part of the empire. Nor do we find that it was until the hopes of the exiled family had finally vanished, and internal peace been permanently restored by the accession of George the Third (1760), that such confidence prevailed as was necessary to induce men to embark capital on improvements where the prospect of return was necessarily at a distant day. Hence it was that, previous to this time, the force of patronage, and even the example of many enterprising landholders in Scotland, proved comparatively

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* *e. g.* Fitzherbert's Book of Husbandry; Tusser's Five Hundred Points; Sir Richard Watson's Work; Blythe's Improver Improved; Hartleb's Legacy, &c.

unavailing; and the progress which had been made in the art of agriculture in the southern parts of the kingdom since the establishment of order there, consequent upon the peaceful settlement of the Hanoverian succession, failed to extend itself to the still divided and harassed country of Scotland. But besides that the restoration of confidence, by the secure establishment of a settled government, led men to turn their attention to sources of wealth less immediate in their operation than those to which the prudent had hitherto resorted, the cultivation of the soil, subsequently to 1765, could not fail to attract greater attention from the great increase in the price of agricultural produce* which took place soon after the accession of George the Third. Accordingly it appears,—notwithstanding soon after this the balance of imports in the article of corn began for the first time very regularly to exceed our exports,†—that the cultivation of the soil throughout the empire, in extent, if not in improvement, nearly maintained its ground with the great increase of population consequent upon the return of personal security, and a state of national prosperity unexampled in the previous history of the country. Agriculture in Scotland, as having been at this time much farther behind, partook even to a greater degree of this improvement; and it is between 1765 and 1775 that we trace the opening of a better system, which had begun to be introduced at the commencement of this epoch. Still, however, husbandry, as generally practised in Scotland, continued in a comparatively rude state; and, notwithstanding the very laudable exertions of many patriotic landed proprietors in various parts of the country, to introduce, by example, a better order of things, no great progress appears to have been made,—excepting in some favoured districts,—in exciting the tenantry to depart from the long-trodden barren path pursued by them. It would appear, at this period, a great proportion of the arable land in Scotland was still very partially enclosed, so that even contiguous farms under tillage were not separated by any distinct fence. The ancient practice almost universally prevailed,—excepting in the neighbourhood of towns, and in those favoured districts alluded to,—of occupying farms as "*In-field*" and "*Out-field*," as it was called. By this mode of

* Average price of wheat, from 1755 to 1764 . . . 37*s.* 6*d.*
1765 to 1774 . . . 51*s.* 0*d.*
—*Tooke's History of Prices*, vol. i. p. 31.

		Qrs.
† From 1742 to 1751—Balance of *exports* of wheat		4,700,509
	All kinds of grain . .	8,869,190
From 1766 to 1755—Balance of *imports* of wheat		1,363,149
	All kinds of grain . .	3,782,734

—*Tooke*, vol. i. p. 72.

management, the land near the steading or farm-offices received all the manure collected and prepared there, and thus an attempt was made to keep those lands for many successive years under a corn-crop, consisting of wheat, or more commonly of oats, bear or barley, and pease; and, although an occasional imperfect fallowing was introduced at the close of each rotation of six or eight years, the constant succession of corn-crops kept the soil in a continually impoverished condition. The out-field-land, which formed the bulk of the possession, was made to grow a succession of oat-crops, generally three, until, exhausted in strength and overrun with weeds, it was suffered, under the dominion of this new possessor,—and without any attempt being made to assist the herbage by the introduction of seeds,—to rest until the caprice of the occupier should deem it prepared to undergo the renewed attempt to produce another series of scanty crops. The only manure applied to this division of the farm was effected by occasionally folding the few live stock then kept upon detached portions of it, after which, in this case, it was expected to yield four or five corn-crops in place of three. Very little wheat was at this time grown in Scotland, and, even upon soils adapted for the successful culture of this grain, the short-sighted cupidity of many landlords prevented its more extensive cultivation, as being of an exhausting nature to the soil. The drill system of husbandry, especially during the early part of this period, was little practised in any part of Scotland, and the culture of turnips in this form, which at this time had its origin in this part of the island, entered only partially into the rotation of a few of the best farms. Potatoes were then only beginning to be cultivated in the fields, and the introduction of grass-seeds had not made any extensive progress beyond the *in-field* of the best districts. Improvements, however, made very rapid progress towards the close of the period under consideration, and the system of leases having come more extensively into use,—since the restrictions in entails affecting their extent was abolished by the act of 1770,—encouragement was afforded to tenants to expend more liberally and to embark farther in a species of speculation which now gave promise of considerable success. Hence, we find rents rose very considerably about this time, and many proprietors, who had expended largely in the improvements lately introduced, found themselves amply remunerated by an increase of rent, in some cases to nearly treble their value twenty years before.*

But as we approach the period of the formation of the Highland Society of Scotland, it will be necessary, in accordance with the required design of this essay,—in order to exhibit "the stages

* Wight's Present State of Husbandry in Scotland, vol. ii. p. 296.

of progress which Scotch agriculture has passed through" since that time,—to endeavour to describe more minutely the general system of agriculture pursued throughout Scotland immediately previous to the institution of this influential society.

Proceeding, then, with our history from the time to which our brief introductory sketch has brought it down, we now find that improvements in agriculture were steadily exhibiting their effects over a great part of the country; and, so great had been the efforts of an intelligent observation and the general spirit of enterprise among agriculturists during the last few years, that even among the tenantry the practice of some of those systems which have found most favour in modern days was in very general exercise. Many of these, no doubt, were far from being perfectly performed, though in their results, from being new, they were in many instances, as we shall afterwards see, fully as successful as in aftertimes; others were conducted in a rude and primitive style, owing in a great measure, perhaps, to the want of proper implements to execute the work in a sufficiently compact and orderly manner.

The practice of granting leases for a series of years was still gaining ground in those districts where agriculture was in favour; but the feeling which induced some proprietors,—in their anxiety to encourage enterprising tenants,—about the middle of the century, to grant endurances of unnecessarily long and even unlimited terms, had given place to a more judicious and prudent system. The rule at this period, and subsequently, came to be to restrict the endurance of leases to nineteen or twenty-one years; and where the principle of corn-rents prevailed to change these to money payments.

But we proceed to notice in detail the progress in improvements which had at this time taken place.* In all the best-cultivated districts it would appear that summer fallowing was now in very general acceptation, though, in the course of cropping, that essential requisite of good husbandry came much less frequently round than was necessary to effect all the good purposes of this practice. Nor do we observe much discrimination in the application of the system; but, like all new practices which had been found in the general attended by many advantages, it was adopted, without regard to circumstances, into universal use by all those pretending to any knowledge in their profession. In East Lothian, for instance,—for which district has been assumed the proud distinction of having led the way in Scotland to improve-

* The writer has been chiefly indebted for his information as to this period to "The Present State of Husbandry in Scotland, extracted from Reports made to the Commissioners of the Annexed Estates, &c. By R. Wight, Edinburgh 1778 and 1784."

ment in husbandry,—we find in the general management a recurrence to a summer fallow only once in the course of seven or eight years; and though the turnip system had at this time made considerable progress in this county, there seems to have been a less frequent substitution of this crop for fallow than ought to have prevailed. These fallows were succeeded by a rotation of corn-crops, which also could not fail to render the return to a state of rest anxiously to be desired by the exhausted soil; and the cleaning process must have been no easy matter after a course of crops, of which the following are specimens, taken from the practice of some of the finest East Lothian farms, viz.:—

Fallow Dunged.
1. Wheat.
2. Barley.
3. Oats.
4. Pease.
5. Wheat.
6. Barley.
7. Oats.
Fallow.

Fallow Dunged.
1. Wheat.
2. Pease.
3. Barley.
4. Clover dunged.
5. Wheat.
6. Barley.
7. Oats.
Fallow.

Variation: Clover after No. 6 (Barley), in which case dung was applied on grass, and wheat followed.

Frequently the recurrence to fallow took place at the end of six or seven years; but still the prevalent practice of a succession of corn crops must have kept the soil in a comparatively foul and inefficient state. The rotations in this case were—

Fallow Dunged.
1. Wheat or Barley.
2. Pease or Beans drilled.
3. Barley.
4. Oats.
5. Pease.
6. Wheat.
Fallow.

Fallow Limed.
1. Wheat or Oats.
2. Beans drilled.
3. Barley.
4. Clover.
5. Wheat.
Fallow.

Or, following a better system, the fallow recurred sometimes after four years.

Fallow.
1. Wheat.
2. Clover.
3. Barley.
4. Oats.
Fallow.

In some of the instances specified above we find a practice prevailed of giving three, or sometimes four, furrows, previous to the repetition of the barley-crop; but, as this could be done only in late autumn or early spring, this sort of bastard fallow could serve no purpose with a view to the cleaning of the land: on the contrary,

would only tend to spread and transplant what couch-grass had been engendered.

In other parts of the country a system somewhat similar to the above prevailed, the great error of the time being the too frequent repetition of culmiferous crops, without a sufficient command of manure. In the Carse of Gowrie, in Perthshire,—a strong clay district,—we find the rotations on those farms most conspicuous for advancement, of a better description, thus:

Fallow with Lime.	4. Clover.
1. Wheat.	5. Oats.
2. Pease or Beans.	Fallow.
3. Barley dunged.	

Or the Oats (5), followed again by Beans, and then succeeded by Wheat, which closed the rotation.

In Berwickshire, upon an extensive farm (1600 acres), where 100 acres had been fallowed and limed in one season, we find the rapacity of the improver inducing him to take the following rotation.

1. Oats.	6. Clover.
2. Barley.	Pasture four years, followed by oats, barley, oats.
3. Oats.	
4. Pease.	
5. Barley, sown down.	

On lighter lands, where the cultivation of turnips had made some progress, and also upon those farms where grazing had found more favour, we recognise a better system of management, though here also the objection still generally meets us of a too anxious desire to scourge the land when under the operation of the plough. The latter we shall notice first, and take as an instance the farm of an individual, at that time the most extensive tenant in East Lothian, and who was held to have given more attention than usual to the improvement of land (very suitable for crops) by grazing. His mode of management and rotation were as follow:—

Fallow dunged.	9. Pease.
1. Barley.	10. Wheat.
2. Clover, hay.	11. Barley.
3—7. Pasture, five years.	12. Oats.
8. Oats.	Fallow.

In another instance we find the mode in use on thin clay-land to be—Fallow, without dung, oats sown down with clover and rye-grass, which were the first year cut for hay. Upon the hay-stubble a rich compost was applied, and the grass pastured for a few years. The ground was then broken up, and "after a *few crops of corn*, laid down again with grass-seeds."

Where turnips and potatoes had been introduced, a better order of things generally obtained, and this system seems invariably to have been attended by a more frequent adoption of artificial grasses in the course. These crops were not in all instances drilled, but this improvement was fast gaining ground. In the Lothians we have rotations of

1. Turnips drilled.
2. Barley.
3. Clover dunged.
4. Wheat.
5. Barley.
6. Grass, pastured.
7. Wheat or Barley, after rag fallow.
8. Oats.

1. Potatoes or drilled turnips.
2. Barley with ware, or seaweed.
3. Beans.
4. Barley.
5. Grass.
6. Wheat.

Or the land, sown with grasses on barley after turnips, was pastured for three or four years; the plan being invariably to cut the first clover-crop, and frequently even the grass of the second year. The soil thus managed was when broken up subjected to three successive crops of corn, viz. :—Oats, barley, oats; or oats, pease, barley. In Mid-Lothian, in the neighbourhood of Edinburgh, and where the benefit of manure from that town was, we find, very laudably called into exercise, the following rotation was observed :—

1. Potatoes, drilled and well manured.
2. Wheat.
3. Barley, sown down with seeds.
4. Hay, fallowed roughly, three times ploughed and dunged.
5. Wheat.
6. Beans, potatoes, and cabbage.
7. Barley.

On another farm, having the advantage of that manure, we have this rotation. Beginning at the grass after cutting the second year, a rag or bastard fallow, to which dung was applied: then

1. Wheat.
2. Oats.
3. Pease.
4. Potatoes and turnips, with dung to the latter.
5. Barley.
6. Clover.

It is in Berwickshire and the neighbouring parts of Roxburghshire, where Mr. Dawson, of Frogden, first introduced and perfected the drill culture of turnips, that we find that operation, even at this time, carried on in its greatest extent and perfection; and the rotation also following this crop best regulated to insure its most effectual and least troublesome repetition. Here we find, for example, some instances of the following rotation:—

1. Turnips.
2. Barley.
3, 4. Grass for two years, cut in the first.
5. Oats.
Turnips.

Being the very same which generally prevails in that district at the present day. It was also in the vicinity of this intelligent individual's farm that, animated by his excellent example,—where 100 acres of drilled turnips were often seen, it is said, at this far-off day, without a weed,—we find a spirit of emulation producing a perfection in the operation and spread of the cultivation of this invaluable crop, which at no very distant day fast made its way among the out-fields of this district. The greater part of the turnip-crop throughout the country was, however, still sown broadcast, and it must be noticed,—as indicative of the deliberate caution and want of enterprise which characterised the agriculturists of that time,—that, although Mr. Dawson's excellent and systematic plan had been nearly perfected fifteen years before the commencement of this epoch, it was only now beginning slowly to extend beyond the district thus distinguished by his spirit and intelligence. In the generality of farms where drilling prevailed, it was still commonly performed by making ridges of from three to four feet wide, upon the top of which one row of turnips was sown, thus, of course, forming a space of equal extent with these ridges between each drill. This, besides causing a considerable waste of ground, prevented the land acquiring the benefit of that fertility which accrues from a close and complete covering. Another mode of growing turnips was, after the land had been dunged, ploughed, and harrowed, to an equal surface, a drill machine was run by the hand along the field, the outside wheel forming the mark by which the return of the implement was conducted. The field was afterwards rolled, and when the young plants made their appearance they were thinned out by the fingers, without the use of a hoe: where drills were formed by the plough previous to sowing, it was no uncommon method first to spread the manure in rows upon the flattened surface—a mode which occasioned, it may well be supposed, great inequality in the rows.

From what has been seen of the mode of rotation in general use, it will be observed that recourse to artificial grasses had not yet been had to the extent which so excellent an improvement called for, and this appears chiefly to have been owing to the comparatively slight regard which was given to the maintenance of live stock, and the consequent increase of that mainspring of good husbandry, rich manure. That the advantages of maintaining a proportion of sheep and cattle upon arable lands were not earlier recognised has been justly attributed to the necessity which it was supposed existed to have annually in crop a large extent of surface, in order to make up the rental-bolls payable to

the landlord: for, until about this time, the great proportion of rents was exacted in kind. Besides, the necessities of the people had not yet imposed upon agriculturists the necessity, and at the same time, advantages to them of extending and improving their live-stock.

Implements.—As to the implements in general use, the old Scotch plough, a cumbrous machine, with its mould-board of wood, slightly sheathed with iron, and having little curve, was still the ordinary implement of tillage in a great part of Scotland. In the more advanced districts, this had some time before given place to the Rotherham or Yorkshire plough, as improved by James Small. This also, upon its first introduction, though having its mould-board of a very improved and more efficient curvature, had still this essential part, as well as the head to which the stock was attached, of wood. Since the adoption of this smaller implement, the use of two horses or oxen only, in the plough, became somewhat generally prevalent, but the usual power employed in this operation still continued to be three or four horses with a driver, or more generally two horses assisting two oxen. We may well suppose the work was not very nicely performed, when so unmanageable a species of draught was employed, especially when the old plough, which merely cut and raised the furrow slice, without reversing it, was used. Nor does it follow, that, in consequence of the application of additional strength in the operation, ploughing was effected to any greater depth than at present: on the contrary,—as in many parts of England at this day, where four horses are used in this work,—there is reason to believe that the soil was generally turned over in a very superficial manner. Hence, also, as we have seen, from the insufficiency of the implements, and the space required for the working of the cattle, the great width it was found necessary to preserve in the rows in the general mode of executing the drill husbandry.

It is believed there has been little alteration in the construction of the harrow in common use since the improvement of this implement suggested by Mr. Alexander Low, of Woodend, in Berwickshire, about the year 1770.

It is conceived to be unnecessary to enter into any further detail upon this head, and that it may be sufficient to mention that the implements of husbandry in general were very limited in number, rude in construction, and, comparatively with those of the present day, inefficient for the performance of neat and orderly labour. Carts, owing to the badness of the roads, were much smaller than at present, and they had their axles altogether of wood. When the drill-system was first practised, small hand-barrows, to sow beans and turnips, were in use, and a small

cleaning or weeding-plough, acted upon by one horse (to operate between the narrow rows), had for some time been of general application.

The threshing-machine, that prince of improvements, and liberal regulator of supplies alike to the necessities of the farmer's purse and to the comfort of the cattle in his folds, had not at this time been perfected. The ingenious inventor of this machine, upon the principle in present operation, had previous to this indeed constructed a wheel to move a set of flails, which met with some encouragement; but hitherto the barn-work was almost universally performed by the slow and imperfect operation of the hand-flail, which, besides that it rendered the personal attendance of the farmer, to the sacrifice of other matters, very unremitting, deteriorated materially the quality and condition of the grain in so moist a climate as that of Scotland.

Manure.—The use of lime in the culture of land seems to have been, at the period of which we speak, of very general application; and it was by means of this very valuable stimulant that so rapid an encroachment appears to have been made upon the large proportion of land possessed as out-field not very long previously. No great judgment seems, however, to have been generally exercised in its free use; nor did any general rule, even in the same district, obtain as to the quantity requisite to produce a given effect. Upon apparently the same species of soils we find this quantity vary from eighty to thirty bolls; and, while many preferred administering a large dose to effect the purposes of a lease, some renewed the application at each return of the fallow-crop. In either case, however, it was too much the practice immediately to exhaust the effects of this manure by too frequent a repetition of corn-crops, and thus to reduce the soil to a greater state of sterility than if no such stimulant had been used. Marl-pits were also pretty extensively opened in some of the higher districts of the country; but, excepting in the neighbourhood of towns, no manure, beyond what was produced on the farm, was ever applied.

In few respects were agriculturists so far behind as in the management of this essential requisite of successful cultivation; and, although we have seen there was at this time the embryo of nearly every approved practice of modern days, yet we find very few traces of any attempt to economise manures, or assist their fertility. Without noticing that in those times straw was generally very insufficiently "made down," as it is technically called, from the small number of cattle maintained in the winter season, the dung was allowed to accumulate in the yard, untouched, until it was required to be ploughed into the land. Hence it was

generally in so rough a state as to be but partially covered with the plough; besides that the previous fermentation, which science has discovered to be best fitted to supply the matter of nutrition to plants, and which experience has taught is most productive of a good crop, was unaccomplished.

Draining.—Under-draining seems at this time to have been very little practised, and, as we have only incidental notice of its existence, it may safely be concluded it was followed upon no systematic rule. All that was generally held requisite was to raise the ridges sufficiently high—and this was very much overdone—for the free percolation of the surface-water to the open furrows; and at this time the perfection of art had attained to little greater height than to form sufficient cross-furrows in the hollows and ridge-ends to prevent the collection of stagnant water on the face of the field.

Fences.—Subsequently to this period the general appearance of the country, where cultivation had gained a footing, showed comparatively bleak and open. Fences were few, and these generally of stone; while the numerous clumps and belts of plantation, which have been so laudably extended, and by which the climate of Scotland has been in general so much improved, were then confined to the immediate neighbourhood of a proprietor's residence. Thorn-fences were now, however, fast gaining ground; and these, being very frequently formed to present a double face, having a ditch in front of each, and a mound in the centre, upon which trees were planted, afforded tolerable shelter, and soon tended to give a more clothed appearance to the country. Still many of the fields remained unenclosed; and, as the grass-lands lay much by themselves, and those parts under culture were seldom in the rotation appropriated to grazing, no great pains were taken to preserve the thorns as a fencible enclosure, too frequently the tenant being satisfied that they afforded materials for repairing the numerous breaches, as, in its course, the fence was needed, or it might have been occasionally to assist as fuel.

Rents.—It is no very easy matter to ascertain with accuracy the comparative value which land yielded as rent at the time of which we speak, in relation to the present. The value of money has now very materially altered, as well as that of agricultural produce; and in making a right estimate it would require that we should be able also to distinguish the relative values of those two commodities at the respective periods. This being a problem which we have not the means to solve, and which we believe is capable of different solutions, according to the particular bias of the mind of the inquirer, it will be sufficient, as regards this general

view, that we endeavour to ascertain, so far as we are able, the money value which the land of certain localities and descriptions yielded at the time under review, leaving it to those who are curious in such discussions to draw their own conclusions.

In East Lothian, where arable culture was at this epoch most extensively practised, many of the rents were still payable in grain; but, estimating the amount according to the then average value of corn, the best lands near the coast (the rotation practised in some of which we have given, being partly occupied in the growth of turnips) yielded from 26*s.* to 30*s.* per Scots acre, this acre being about a fifth more than the English statute measure. Farther inland, and where the soil was stronger, but of a mixed character, several farms, now considered equal to any of this description in the county, appear to have been let at a money rent of from 21*s.* to 26*s.* One farmer, occupying 1800 acres between the shore and the county-town, to whom we have already alluded, paid upwards of 1600*l.* for his possession. In the higher parts of the district, 12*s.* and 14*s.* per acre were common rents; and it has been estimated that three-fourths of the arable part of the county were rented at not above 15*s.* per acre, at this era. The current leases of some of the finest lands upon the coast, eastward from Dunbar, belonging to the Dirleton estates, we find it stated * were entered upon about ten years before, at a rent of 30*s.* per acre. "These rents," it is added, "were formerly paid in grain; and, calculating the value of that grain according to the fiars (average) of the preceding twenty-one years, a considerable rise of rent appeared, though, as the value of grain gradually advanced, the rise was more nominal than real." † In Mid Lothian,—where no advantage accrued from vicinity to towns,—and in West Lothian, the rents of good lands varied from 21*s.* to 30*s.* per Scots acre.

Some of what are considered the best farms in Berwickshire now were then let at about 10*s.* per English acre; while others, not esteemed at present so good, though also of a superior description, yielded nearly 15*s.* In that part of Roxburghshire adjoining, those farms where culture had made some progress, and possessing no extraneous advantages, were rented

* Farmer's Magazine, vol. xii. p. 346.

† From the comparatively advanced state which agriculture had attained in East Lothian at this time, there is perhaps less difference in the amount of rents there now than in any other part of Scotland; and it is believed that many of the farms above alluded to, though very much higher-rented during the war of the French Revolution, at the conversion to grain-rents which took place in so many instances subsequently, from the low price of corn, for some years after yielded very little more than the sums above stated.

on somewhat similar terms. The Carse of Gowrie rents we find stated about this time at 20*s*. to 27*s*. per Scots acre, though it is added, "the latest leases go from 40*s*. to 45*s*." In Fife, the best lands appear to have brought 25*s*. to 27*s*., but this rent was limited to a very few farms on the shore, for agriculture had hitherto made comparatively short progress in this county. With regard to the rent of sheep-farms, then, as at present, these were not taken by measurement, but according to a computation as to the number of sheep they would maintain, other circumstances of soil and shelter being considered; and the ordinary rent at that time, on the South Border at least, was from 2*s*. 6*d*. to 3*s*. and 3*s*. 6*d*., for each sheep which it was calculated the land would keep.

In this sketch it will be observed that we have not adverted to other districts, where the value of land may have been, in some instances, higher, and where agricultural improvements may have partially made equally great progress at this time, as our object has been more to afford data by which a comparative estimate may be made in after-times of the rent of the best description of arable land in different localities, than to make the vain attempt to exhibit either the variation of rent payable for each description of land, or to show the distinctions which existed in different quarters. But it will be found in general that we have endeavoured to collect the instances given from those districts where agriculture at the time had been most extensively practised. It may be here mentioned, that in such districts the occupations were now becoming frequently very large, and many arable farms extended to 800 or 1200 acres, ordinary possessions varying from 300 to 500 acres. A few tenants held more than one of such farms, but in general this practice was not so common, nor were the farms so generally extensive, as at the present time.

Produce.—It can scarcely be expected that, at this distance of time, we should be able to afford a very accurate account of the annual produce of the different varieties of crops. There are two circumstances especially which operate materially against arriving at a just conclusion on this subject, one of which may be said to prevail at all times, viz., that partiality with which improvers are generally led to regard their own work, by which they are induced to select a favourable instance for their illustrations: the other arising from the indistinctness of quantity which obtains, as, in the statement of the produce in different districts, the measures of capacity, though varying in different localities, are seldom, there is reason to believe, sufficiently distinguished. The former circumstance we have been led to assume as having place in a great number of the estimates of produce which have come down to us, in consequence of these being in general so large, though no

doubt it is highly probable, when an improved system of management was primarily applied to those favoured spots where agriculture naturally first attached itself,—even when the operations were far from perfect,—that a higher produce was the result than obtains now under similar circumstances, where, by long-repeated efforts, the soil may be presumed to be comparatively exhausted. And this leads to the incidental remark that herein consists the pre-eminent superiority of modern agriculture, that under the disadvantages of continued culture it is thus capable of maintaining fertility.

We shall only attempt, then, to give such examples as may afford some criterion of comparison, and where we are best supplied with information; and take our instances from those lands in highest cultivation, or rather, combining this circumstance with the estimation in which the lands alluded to are held now, we are led to consider most capable of yielding a large produce, premising that these instances rather afford evidence of the *highest returns* of the time than of a fair average.* The first crop after fallow we generally find stated as yielding a large produce. When in wheat—converting the estimated produce into Winchester bushels—the general result may be given, on those fine soils, at from 30 to 40 bushels per Scots acre; the barley following, at between 36 and 48 bushels. The oats which followed were expected to give from 30 to 48 bushels. The pease, next in the succession, were held very precarious, varying from scarcely anything but straw,—which was held in considerable estimation,—to 46 bushels per acre. The wheat, upon its repetition after so many previous crops, we still find stated, in some instances, so high as from 28 to 40 bushels; while, as more naturally might have been expected, it is given as 24 bushels. The second crops of barley after this wheat,—previous to which the land, as in the first instance, indeed, received a sort of bastard fallow, being thrice ploughed,—gave 30 to 35 bushels; and the oats, which followed, produced 24 to 35 bushels per acre.

When the barley came first after fallow, 40 to 60 bushels per Scotch acre, it is stated, were not uncommon. After turnips, 42 to 54 was the general yield. The produce of barley, after turnips, in one instance we have met with, is stated at 60 bushels per acre. Then follows clover, succeeded by wheat, yielding 40 bushels per acre. Beans yielded 30 to 36, and were sometimes so high as 48 bushels per acre.

In some instances where land was newly broken up after five or

* These preliminary observations were considered necessary, from seeing, besides, that the average produce of England and Wales, even in later times, is estimated at very much under what is given below.

seven years' grass, we have a yield of 60 to 72 bushels of oats, stated as the result per Scots acre. The pease following were from 20 to 40, and the wheat after, 32 to 40 bushels per acre. In Perthshire, in the Carse-lands, the result is somewhat similar, but beans are frequently stated as giving much larger returns than that stated above. But it is considered unnecessary to go further with any minuteness into this examination, as there appears,—excepting upon the high and inferior land,—so great an equality of productiveness at this time throughout the country. This similarity is, no doubt, owing to the statements which have come down to us having been furnished only by those who were engaged in the application of recent improvements, and which had extended themselves hitherto to the best soils only of the respective districts in which agriculture had gained a footing. Hence, although the situations are different, there might be little dissimilarity of the land from which the results are obtained.

It is almost unnecessary to observe that universally, as might be expected, we trace a diminution of produce as we go down the list of repeated corn-crops; and this is peculiarly observable in following the progress of the productiveness of those fields reclaimed by liming, previously occupied as out-field. Upon the first application of this stimulant, upon breaking up these lands, we have success shown in production fully equal to the same application to the best in-field land, amounting to 60 bushels of oats per acre, and in some cases even more; but by the repeated return to culmiferous crops they gradually diminish, until, before being returned to grass, the produce is reduced to 18 and 20 bushels, if, indeed, they continued to bear corn at all. The result, however, of the whole examination is to show a much larger return than what, from the system pursued, and particularly the very frequent recurrence of corn-crops, could have been anticipated. And here it is worthy of observation, when we take into account this latter circumstance, in no more prominent light can be shown the great additional extent of cultivation which has spread on all sides over the country since the period under review. In 1780 the population of Great Britain amounted to little above 9,000,000; in 1830 to upwards of 16,500,000; and while, in the former epoch,—with no important variation as regards this matter in the amount of importations of grain,—the whole growth of this country did no more than maintain its inhabitants, in the latter, sufficiency was still produced for the whole population.

Live-Stock.—In no respect has the agriculture of Scotland been so much improved as by the great increase of cattle and sheep now maintained upon the arable land. Until the spread of the growth of turnips and clover, no more could be kept than what

the scanty produce of natural grasses, converted into hay, enabled the occupant of land to maintain during a winter of long endurance. And, as we have seen that a comparatively narrow extent of land was occupied at this time with these valuable crops, the number of cattle and sheep maintained was necessarily still very limited. It is accordingly in the border counties, from which the improved turnip system emanated and first spread to any extent, that we find the greater number of instances of care being given to this essential branch of good husbandry. The mode of fattening in this district was by stall-feeding, but it is evident no great improvement had taken place in rendering cattle susceptible of early maturity, since we find they were not fitted for the shambles until they had attained the age of four or five years. Throughout Scotland, generally, at this period, indeed, no particular variety of cattle seems to have been held in especial estimation. It is true, then as now, the Galloway breed prevailed in the south-western district, while the West Highland were held in equally high fafour in the northern counties. But in those parts where cultivation had made the greatest progress, though Bakewell's breed had been introduced ten years before by some spirited proprietors, and had been adopted by a few enterprising tenants, they had not been carried to any great extent; and from their having been injudiciously managed, and from indifferent keep in some cases, many even began to think they were not calculated to effect any improvement.

In like manner the Dishley, or new Leicester sheep of Bakewell,—which had been introduced about the same time,—from their having been attempted in high and unsuitable districts, had become liable to the suspicion that they also were not adapted to the climate of even the better parts of Scotland. Some very notable exceptions, however, existed, and this breed had partially found much favour in the Lothians, and particularly in the south-eastern counties; where, from their vicinity to that quarter of England where Bakewell and Culley's rams were held in such high estimation, a great impróvement was effected on the indigenous cross breed of the country by means of these rams, for the hire of which a high price was paid. Folding upon turnips had also been practised to some extent in those parts where the cultivation of this valuable root was best understood; and we find as the result, that the sheep improved by this cross acquired a weight at two and a half years old equal to what the Leicester breed of the present day attain, with ordinary feeding, at from one and a half to two years; while the weights of the fleece are stated as being nearly the same with the improved breed now: we have to take into account, however, that, in the former period, salving universally prevailed, which materially added to the weight.

The Cheviot breed prevailed all over the southern border, and obtained there also—together with a cross of the indigenous sheep of Northumberland, obtained by an admixture of the Tees and Lincolnshire breeds—in many of the lower districts now possessed by the new Leicesters. The black-faced and native dun sheep, which occupied the more rugged and stormy hills, had now begun to be encroached upon by the Cheviots; and a favourite mode of effecting this end was by the introduction of the Cheviot ram, which, in the course of a series of years, accomplished a complete resemblance to the species of the male, though these flocks long remained inferior to the paternal breed. The short, or black-faced breed, maintained possession of the other mountainous districts of Scotland, and may be said to have been the only sheep in the Highland districts, though this part of the country was then much more occupied by black cattle; and we have at this time no trace of the valuable and extensive flocks of Cheviot sheep which now prevail there.

Upon the whole, from this rapid survey it will appear that many of the fundamental improvements in the art of agriculture had at this time an existence, and in some cases were even called into pretty extensive operation; but it is evident also that their efficiency was in general prevented from obtaining due development, mainly in consequence of an over-estimate of the power of those improvements, whereby their salutary influence was destroyed in many cases, by too large and too rapid a demand upon their expected efficacy. It is true the most approved systems, even as then known, had not extended far; yet the bright spots were so well scattered abroad, and in many places so favourably spreading out, that it was evident a spirit was in operation which, if it met with ordinary encouragement, promised, at no distant day, to beautify and enrich the land.

Nor were favourable circumstances now wanting to promote the advancement of agricultural improvement. The war with America, which had occasioned no inconsiderable interruption to the progress of trade and manufactures in Scotland, was now brought to a close (1783); and, soon after the restoration of peace, a period of prosperity and advancement followed, hitherto unexampled in the history of the country. The increased demand for all sorts of agricultural produce, consequent upon a higher rate of wages and the generally improved habits of the people, gave an additional impetus to agricultural exertion; and men's minds were naturally directed with greater interest to the promotion of a branch of industry so necessary and important to the growing prosperity and rapidly increasing population of the country. Concurrent with this favourable state of circumstances, the Highland Society of Scotland was formed; and it would be unjust, therefore, to at-

tribute the rapid improvement which, at this time, became so conspicuous and simultaneous in so many parts of the country, and for some time subsequently, in the first instance at any rate, to the efforts of this munificent body. It may with more propriety, in reference to this period, be said, that the Highland Society owed its existence to the spirit of agricultural improvement then called into exercise than that it originated this spirit. No doubt, although the attention of the Highland Society was, on its first institution, chiefly directed to that quarter of Scotland to which its name peculiarly bears reference, and its first volume of Essays and Transactions was not published until 1799, still the regard of the Society was early attracted to the promotion of agriculture generally throughout Scotland; and besides that the private influence of its members tended much to promote beneficial views to this end, useful hints were circulated by means of its advertisements, and a spirit of praiseworthy emulation was encouraged by its very liberal distribution of premiums, which tended to assist in disseminating the knowledge of those improvements which existed in other parts of the country.

But still the fresh spirit of improvement, induced by the greater prosperity, was, in Scotland at least, comparatively limited in its operation, and conceiving that no extraordinary impulse was given to agricultural exertion there, until the year following the season of 1795, we assume the epoch between 1783 and this period as that to which we shall rightly be able to apply a general description; and stopping at this latter period evidently best marks—as has been required—the first particular point of change which has arisen in the progress of improvement.

In general we find this era is more distinguished for the extended application of those principles which had already been in operation, than for the introduction of anything new in the art of agriculture. Besides the unprecedented increase of population which took place at this time, and which created a great additional demand for the ordinary descriptions of food, the improved habits of the people at large, and a more full and substantial mode of living, gave rise to a much more extended use of wheaten bread and butchers' meat. The increased luxury of the higher classes, in servants and horses, also operated a further demand; and new markets so near home being established in the increasing towns and villages throughout the country, imparted a spirit to the energies of the farmer, which were principally applied to the further reclaiming of those lands which had not hitherto been brought under the influence of the plough. It is highly probable more attention was given to these fresh lands, from much of what had been previously applied to the growth of corn-crops having become deteriorated, to a great extent, by the practice of over-crop-

ping already alluded to. No doubt the same cause which operated the necessity of an application to new soils tended to a more careful attention to rotations and a restricted use of grain-crops. Accordingly, it appears that, in those districts where agriculture had made most extensive progress during former times, a considerable improvement now took place in the system of rotations, particularly by the more frequent recurrence to artificial grasses and turnips, towards which improvement the high price of butchers' meat no doubt tended. A more perfect mode of cultivating the latter crop also now prevailed in a great degree, so that Dawson's system of sowing upon drills,—at twenty-eight inches apart, separately formed and made up by the plough, after having the manure applied in the centre of each,—may be said to be the only plan adopted in those parts where any pretensions were made to the knowledge of turnip-husbandry. The rotation practised with success by the most eminent farmers, at this time, we find so much improved as to be stated thus :*—

I.—On strong rich clays.

Fallow.	3. Barley.
1. Wheat.	4. Clover.
2. Beans.	5. Oats.

II.—On deep free loam.

1. Turnips.	4. Oats.
2. Barley.	5. Beans.
3. Clover.	6. Wheat.

III.—On light, weak, and gravelly soils.

1. Turnips.	3. Clover.
2. Oats or Barley.	4. Oats, turnips, &c., as before.

We should be mistaken, however, were we to suppose that this more gentle course—though far from unexceptionable, considering especially the mode in which some of the operations were performed—was the general rule of management on such lands at this time. We know that the frequent corn-crop system still prevailed, and the vicious mode—even when clover came to be adopted in the course, which certainly now became more frequently the case—of interposing two culmiferous crops and a crop of pease or beans between the fallow or turnips and the clover, even on light lands, was still very prevalent. Thus—

1. Fallow or Turnips.	4. Barley.
2. Wheat or Oats.	5. Clover.
3. Pease.	6. Oats or Wheat.

* Essay on Green Crops, by Mr. P. Brodie, Garvald, Haddington, Highland Society's Transactions, vol. i.

We must not omit to mention that the cause of agriculture received much valuable assistance at this time from the indefatigable exertions and patient industry of the late Sir John Sinclair, to whose unwearied perseverance the country was indebted for the institution of the National Board of Agriculture, under the auspices of which so much excellent agricultural information was shortly after disseminated throughout the country, through the medium of the statistical accounts and county surveys.

Implements.—It is deserving of particular notice, that during this period the threshing-machine, as completed in all its chief principles by Mickle, began to come into use, and though chiefly then operated upon by animal power,—so as to detract somewhat from its economy in labour,—its advantages were conspicuously felt, both in the superior efficacy of the operation and the improved condition in which it enabled the farmer to bring his grain to market. It was also of infinite use, in unfavourable seasons, in affording a speedy method of saving such corn as proved to be unfit to stack, or threatened to spoil when thus prematurely disposed of. In short, no other application of machinery to agriculture has been of such importance to the farmer in giving him a complete control over his crops.

Small's plough had now come into universal operation, excepting on some stiff soils, especially when first broken up from grass, or extraneous obstructions occurred, in which case the old Scotch plough was still in favour; and it was only then also that more than two horses or oxen were used in this implement. The latter,—for which a growing partiality appeared to exist during the last period under review,—had now given place, to a considerable extent, to horses, as being more fitted for the more general purposes of draught, to which the improvement of the times had given rise. As we consider it necessary only, under this head, to notice marked improvements, it may be enough here to state that drill-machines, for depositing in rows both grain and turnip-seeds, were now coming into use; and several new implements, though also of a rude construction, were being employed for horse-hoeing between the drills.

Rents.—The steadily higher rates which characterized the price of grain for upwards of twenty years immediately preceding 1795, in comparison with what they had borne in the earlier part of the century,* tended materially to continue to raise the amount

* The average price of wheat, from 1701 to 1766 was 32*s.* 1*d.*
" " " from 1773 to 1784 — 48*s.* 8*d.*
" " " from 1784 to 1795 — 50*s.* 2*d.*
—*Tooke's History of Prices*, vol. i. p. 83, *&c.*

of rents; and, the average rate of prices still going on to increase, we accordingly find that a further improvement took place in the value of land during the period now under review. Indeed nothing tends so much to show the steady advance which at this time marked the progress of agriculture in Scotland as the increased rental of the country since the close of the American war. At that period it could not have amounted to more than 1,500,000*l.* In 1795, it is believed to have exceeded 2,000,000*l.*

Live-Stock.—The more frequent recurrence of artificial grasses in the rotation of crops, and the greater breadth now devoted to turnips, caused a proportional increase in the quantity of live stock, to which the still further rise in the price of butcher's meat, of course, contributed. Hence, also, increased attention came to be given to the improvement in the form and size of both cattle and sheep; and the more frequent application of the Dishley or New Leicester ram, and of the Teeswater bull, was beginning to exhibit its effects in the somewhat improved quality of stock shown at the country markets. Still, however, not many entire flocks of the pure Leicester sheep were to be found at this time throughout Scotland; and the high price, in many cases, given for the hire of Bakewell and Culley's tups, as well as for Colling's bulls, by a few Scotch agriculturists, was rather to improve the native breeds of the country than with any ambition to generate a pure stock, which was still generally considered at this time unsuitable to the climate of Scotland.

But we hasten to go on to the next period as infinitely more marked and conspicuous in the bright career of Scotch agriculture. The epoch from 1795 to 1814 exhibits, indeed, an era unexampled in the history of improvement in any other country. Many favourable circumstances operated to produce this result, and that these events, equally applicable to the sister kingdom, did not produce so striking an effect in England, can be accounted for in part from the circumstance that she previously occupied a more elevated position in the scale of improvement. But the want of leases there, perhaps, more than any other cause, contributed to her having been outstripped in this laudable struggle.

Great Britain was now engaged in the heat of the war occasioned by the French Revolution; and, without going into the abstract question as to the general effects of war upon prices, there is no doubt that the peculiar character of that contest tended materially to affect the price of agricultural produce, both in this country and throughout Europe. The extensive military operations carried on over a great part of the Continent could not fail to interfere seriously with the productiveness of those countries where such distractions existed; while the obstructions to commercial in-

tercourse enhanced materially the value of our supplies from abroad, which at one time, indeed, were nearly cut off by the peculiar tactics of the enemy. These causes induced a greater attention to be devoted to agriculture here. But, above all, the great rise in price, chiefly attributable to the frequent recurrence of bad seasons at this time, tended to give an extraordinary impetus to agricultural energy. The average price of wheat, which had been under 50*s.* per quarter during the twenty years immediately preceding 1795, rose, in that year, to the average of 81*s.* 6*d.*, and in the subsequent year at one time reached 96*s.* The price, however, recurred to the average of 54*s.* in 1798, owing to the favourable seasons of 1796 and 1797; but a series of excessively high prices followed,* which was attended by a great degree of prosperity to all persons engaged in agriculture. No doubt, this great rise of price was occasioned chiefly, as we have noticed, by a cause which operated also to lessen considerably the disposable quantity of farm produce; but it has been demonstrated† that the effect of a deficient crop is to raise the price of the produce of the land greatly beyond the ratio of the defect, and, consequently, that a larger sum, in ordinary cases, is distributed among the growers after a year of deficiency, than is derived from medium or abundant crops. Besides, higher prices, from whatever cause, act in enhancing the estimation of the profits of that pursuit from which they are derived. Hence the profits obtained from agriculture came to attract attention, and a liberal application of capital ensued. Those engaged in the cultivation of the soil eagerly sought after information in their profession—more anxiously observed and copied the improvements of their more intelligent neighbours—and a praiseworthy spirit of rivalry generally obtained. The liberal premiums offered by the Board of Agriculture, and subsequently by the Highland Society, fostered this spirit, and were of great service in further diffusing the knowledge of approved experiments, and of the application of more correct principles.

The exertions of the Highland Society, now applied more generally to agriculture throughout Scotland, came more prominently into operation; and to the valuable publications of that patriotic body, and to the voluminous statistical information published under the direction of the National Board of Agriculture, are mainly owing the unexampled rapidity with which the improved system of husbandry spread over the land. Liberal premiums continued to be given by these munificent institutions, for communications on useful and approved details in the practice of

* Of the 20 years from 1794 to 1814, the average price of wheat was 89*s.* 7*d.*—*Eton Tables.*

† Young's Annals of Agriculture for 1796, vol. xxvi. p.469.

agriculture; which, with the district competitions of the Highland Society, tended to foster and encourage that spirit of enterprise which was so fast gaining ground. These, again, gave rise to numerous local Agricultural Societies, which met with great and laudable encouragement from resident landed proprietors, and excited great interest among the tenantry. The object of these local societies was principally directed to the improvement of the various breeds of live-stock deemed most suitable to the respective districts in which the competitions were held, and proved of incalculable benefit in quickly disseminating improved varieties throughout the country.

The greater interest which came to be bestowed on agriculture generally also gave rise at this time to numerous other useful publications on this important subject; and among these deserves particular notice, as having been highly instrumental in this work of rapidly-extending improvement, 'The Farmer's Magazine,' commenced at Edinburgh in 1800. Although, no doubt, we fear we must admit that no small prejudice exists among the generality of farmers with respect to the utility of information thus acquired, yet it is impossible to deny the powerful influence of the press in effecting a revolution even in this unobtrusive art, in spite of such feelings. It is true, some discrimination is required to avoid the evil, and choose the good, from many such publications: yet the intelligent man, having made his selection, and cautiously, if need be, entered upon his experiments, success no sooner attends his efforts than the result—as all operations in husbandry (from their nature) are openly displayed—becomes known to his observing neighbours, and the improved practice passes into general use.

A combination of so many favourable circumstances soon became evident in the rapidly improved face of the country. The liberal returns from agriculture gave rise to an increased application of capital to the soil, to an extent indeed, in many instances, which—as matters turned out—in the end frustrated the accomplishment of individual reward. A spirit of intelligence prevailed more generally among those engaged in husbandry, and more judicious and correct principles came to be applied in the chief operations of the farm. A further improvement took place in the system of rotations: clovers were now extensively cultivated; a great breadth of land which had been managed by an imperfect fallow was applied further to turnips; and it came to be the universal rule that clover, or some description of fallow-crop, was interposed between every two culmiferous crops. But the order in which cropping was pursued was beginning to be regulated, not so much by any fixed rule of rotation as by the application of correct general principles, varied often according to results: still the most common

rotations, on free good soils, with some depth, came to be turnips, wheat or barley, clover and rye-grass, oats. On the thinner lands of this description the general plan was to pasture for two or more years. The strong, thin clays were commonly subjected to a rotation of fallow, wheat, clover and rye-grass, and oats; while, upon those of more depth, and of a generous nature, the rotation was more varied, and a larger demand was made upon the soil, viz.: Fallow, wheat, clover and rye-grass, oats, beans, wheat, and a return again to fallow. Sometimes the clover was postponed and the cropping made in this order:—fallow, wheat, beans, barley, clover, oats; but as a general system this must be allowed to be open to the objection, that, if an unfavourable season occurred in the operation of fallowing, or in the preparation for beans, the land would be out of order for the reception of the grass-seeds.

It was thus the more frequent recurrence of leguminous crops which formed the marked distinction of the improved practice of the period; and, besides that it was a condition in most leases that no two white crops should follow each other in succession, most farmers had now become aware that little profit would accrue to them from such a practice, excepting where there existed such a command of manure as enabled them to counteract the consequent deterioration of the soil. The more judicious alternation of crops had, no doubt, been productive of this requisite to some extent; but the supply of dung in ordinary cases, it is well known, is barely sufficient, from a given quantity, to maintain the generality of land in good heart under the gentlest mode of treatment.

Manures.—To this important branch of good husbandry a growing attention was now paid; the soiling of cattle in hammels, and the larger supply of turnips, contributing materially to the increase, as well as quality, of the manure. Straw, from the greater abundance of better food, was now in much larger proportion supplied for litter to cattle, and this, being richly saturated with the excrementitious matter of animals now fully fed, afforded a dung-hill, even applied in the same quantity, of more than double the productive effect. Besides, these dung-hills were now carefully laid out to undergo the necessary process of fermentation, suited to the different crops and varieties of soil, and, when applied to the land, every economy was used in the time and mode of application. Great attention came also to be paid in collecting extraneous vegetable matter, scourings of ditches, &c., for the making of composts; and that of Lord Meadowbank particularly, of peat-moss and farm-yard dung, was now in high favour. Lime continued to be applied liberally, though perhaps scarcely to the same extent, in those districts where it had formerly been so freely used, or rather

abused. The state of the land to receive this valuable stimulant, and the proper effête condition of the lime at the time of application, was now, however, better understood, and thus that important manure came to be more economically and advantageously employed. Still, beyond this, a very limited quantity of foreign or extra manure, compared with the present time, was used by farmers in Scotland. Bones, although in use at this time in many parts of England as a manure, it would appear were scarcely known on the north of the Tweed, even so late as 1812, to possess any virtue of this kind, as we find a correspondent of the Farmers' Magazine of that year stating the practice of our southern neighbours in this respect as an important discovery. Neither does the application of rape-cake to the soil seem to have obtained in Scotland, until some time subsequently to the period now under review.

Draining.—As it may well be supposed, no great extent of improvement could be effected in Scotland without the essential work of draining forming a material part of the amelioration, so this operation was now much more extensively carried on. Under-draining was, however, still very imperfectly practised, and, in most cases, upon no particular understood principle. It was, generally, only where spouts or springs made their appearance on the surface that any attempt was made to remove the evils of superabundant moisture. In part, Elkington's method formed the basis of the practice, but it was generally very much subject to be varied by the caprice of different operators. The Highland Society early directed its attention to the efficient introduction of this system into Scotland; and when the Board of Agriculture—besides having procured a reward of 1000*l.* to be given to Mr. Elkington—sent Mr. James Johnston to England to get instructions in his system, the Highland Society patronized the publication by Johnston of a treatise on this method of draining, and recommended it strenuously to the public. It was generally considered, as thus recommended, too expensive an operation for general adoption by tenants, and met with no great favour from them, excepting in a modified extent; nor has the system, when more carefully followed out, been in many instances attended by anything like complete success. In short, great deficiency and imperfection still characterized this department of rural economy.

Implements.—It was not so in the branch next to be noticed. Here a marked improvement had taken place, and we find, though not perhaps in equal perfection, almost every approved implement of the present day. The use of these was now also greatly extended; and, wherever arable culture was practised, not only does

it appear that effective implements were in operation, but these were commonly the manufacture of a resident mechanic. The Scotch plough had been entirely superseded; and it was rare anywhere to find oxen employed in agriculture, or more than two horses in an ordinary plough. It was during this period that John Wilkie, an ingenious mechanic in the West of Scotland, effected considerable improvement upon this fundamental implement, and succeeded in forming it efficiently of malleable iron; which material, as possessing greater strength and durability, soon crept into favour, and is now of nearly universal application in the manufacture of this implement throughout Scotland. Improved implements were also applied to drill husbandry, both for depositing the seed more equally in the rows, and for efficiently cleaning the land between the drills. But above all the threshing-machine, upon which considerable improvements had been made, had established itself so universally over the country, that upon scarcely any farm of above 150 acres of arable land was there not one to be found. Animal power was at this time most commonly applied to this valuable machine, but the application of water and wind had now become very frequent upon large farms. It is believed steam had also in a few instances been employed, as the moving power to threshing-machines, before the close of the period.

Live-Stock.—The great rise in the price of butcher's meat, during the war, gave prodigious encouragement to the production of live-stock, and caused increased attention to be given to this important branch of husbandry. As, during the last period under review, a considerable addition was made to this kind of produce, greatly owing to the extension of an improved method of arable culture, so it appears highly probable that the rapid advance of the clover and turnip system was now much favoured by the extraordinary demand for butchers' meat, to which the better condition and increased luxuries of the people now gave rise; for there can be no doubt that the improved mode of tillage is productive of a much greater weight of this necessary commodity.

There is no statistical information upon this subject by which a comparative estimate of this increase can be correctly formed, but there is reason to believe, taking into account the increased number of inhabitants supplied, and their greatly improved condition, that it could not have amounted, at the close of this period, to less than 30 per cent., compared with what it was at the beginning, upon the number of cattle alone; and we have no doubt the increase upon that of sheep, independently of their improved weight, may be taken at fully more. It was in a great measure owing to the improvement in the breed of stock, by which earlier maturity was accom-

plished, that this large increase was effected. To this result the Highland Society mainly contributed. From its earliest institution this munificent body established and encouraged, by liberal premiums bestowed at district shows of live-stock, the purity and improvement of the best native breeds—the West Highland, Aberdeen, Angus, Fife, Ayrshire, and Galloway cattle, and Cheviot and black-faced sheep. And though its attention was subsequently directed to promote the introduction and use of the finer and larger breeds, where that seemed to be practicable or desirable, little had been done at this time in that way. Numerous local societies, however, sprung up, which devoted themselves chiefly to this end, and proved of infinite service in spreading the knowledge of the superiority of the pure breeds; and were, above all, eminently instrumental in introducing the more extensive application of these finer and larger species. Before the close of the epoch now under consideration, accordingly, the prevalent use of the short-horned bull, in many parts of Scotland, became very conspicuous in the improved character of the lowland breeds of cattle; while, in the pure Teeswater, a few agriculturists on the south-eastern border began to vie with their southern neighbours. But it was in the improvement of sheep that at this time most progress had been made, especially in the district just alluded to. The new Leicester sheep had now possession of a great part of the arable land of those counties. These were not indeed in all cases the pure Dishley stock, but were more commonly the result of repeated applications of the male to the Cheviot or native Berwickshire breeds; and while, in their appearance and chief excellencies, they came to resemble the pure breed, they were perhaps, from their maternal origin, better fitted for the less favoured climate into which they were introduced. The pure Cheviot, displaced in some degree on the lower, still continued to gain ground on the higher districts; and this period is particularly remarkable, as that of their extensive introduction into the Northern Highlands, where they have proved so eminently successful. An attempt was also made to introduce there and in some other parts of Scotland, as a cross, the Southdown and Merino breeds, about this time, which however has not proved successful.

Rent.—But what, above all others, is indicative of the astonishing degree of improvement which accrued during this period, is the unprecedented rapidity with which the rent of land got up. There is every reason to believe that the estimate which states the rise of the arable portion of the land in Scotland to have amounted to considerably upwards of 100 per cent. is nearly correct. We have seen that, in 1795, the rental has been given as amounting

to 2,000,000*l.* In 1815 the total rental of Scotland, exclusive of houses, amounted to 5,278,685*l.* "It is difficult," says Mr. M'Culloch,* "to decide as to the share of the entire rental to be set apart as the rent of 14,000,000 of uncultivated acres, but there are good grounds for thinking that it does not exceed 850,000*l.*" Now this would leave a balance, as the rent of the arable land at this time, of upwards of 4,400,000*l.*, showing an increase of 2,400,000*l.* in the short space of twenty years! "So rapid an increase of rent," adds Mr. M'Culloch, "is probably unmatched in any old, settled country."

Produce.—It is to be regretted we have no sufficiently accurate statistical materials from which a correct estimate can be formed to what extent the increased *value* of agricultural produce warranted so extraordinary a rise in the value of land. There is little doubt this increased rental is in this instance beyond the proportion of the *further price* of agricultural produce, and therefore can only be accounted for by the *additional amount* of the productiveness of the soil under a better system of management. We should be inclined to think the produce, in average seasons, at the latter end of this epoch, from good descriptions of land, may be assumed as—

Wheat,	26 to 28	bushels per	English statute	acre.
Barley,	38 to 42	,,	,,	,,
Oats,	44 to 46	,,	,,	,,

While the lighter and thinner soils, under the same circumstances, would yield of—

Wheat,	18 to 22	bushels.
Barley,	27 to 30	,,
Oats,	30 to 35	,,

There was at this time still a great breadth of a lower description of land, affording a less certain, as well as generally a greatly inferior return, which will bring this estimate perhaps even lower than the general average for Scotland adopted by Mr. M'Culloch in his Statistical Account,† of 24 bushels for wheat, 28 for barley, and 36 for oats.

We may fairly then conclude that, besides the greater extent of land which the increased quantity of manure, arising from additional stock, enabled the farmer to cultivate better, the whole value of this increased stock was a clear addition to the produce of the soil; and, consequently, to the farmer's means of paying rent.

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* M'Culloch's 'Statistical Account of the British Empire,' vol. i. p. 539.

† Page 537.

We now proceed to bring down the survey to the present time,* and, it is presumed, we shall—after the description which has already been attempted to be given of Scotch agriculture, in surveying its progress — best perform the task (so far as the general view is concerned) of describing the system of husbandry which at present obtains, by now noting only the chief improvements which have been introduced since the close of the period last under review. But before doing so it will be right to take a general glance of the position which it now occupied, and the chief events which characterised its progress.

It may be observed, then, that this last period throughout is peculiarly marked by the greater intelligence which came to be applied to the pursuit of agriculture. The desire for correct information, which at the close of the former period began more generally to prevail, was early gratified by the publication of many useful works upon husbandry, and accounts of the improved practice which so generally obtained. Among them deserve to be particularly distinguished the vast amount of statistical information connected with the agriculture of Scotland, and the accurate description of the prevalent systems, collected and systematically arranged, under the patronage and direction of the Board of Agriculture, by the indefatigable exertions of its amiable and persevering president, Sir John Sinclair. These were mainly instrumental in diffusing the knowledge of better practice, and powerfully contributed to dispel prejudices in quarters where they were known to be most obstinate. The Highland Society too continued to extend the offer of its premiums to subjects connected with the general agriculture of the country; but it was not until a subsequent period of this epoch, and after the unfortunate dissolution of the national board, that the former became so conspicuously the patrons of the farmer. Still the exertions of this patriotic society, now embracing in the list of its members all the opulent and powerful throughout the country, and spreading its ramifications wherever a desire for encouragement was expressed, even at this time, did not fail to act powerfully upon a class, now so anxious to profit by the spread of additional information. The majority of large farmers were now men who had received a liberal education, and were many of them distinguished by that spirit of

* It has been thought best to include the whole of this time in one epoch; for, although, during the earlier part of it, agriculture received a check in its *resources*, which was attended in many instances by individual suffering, and in all, it is believed, by no financial addition, its *progress* was in noways paralysed; on the contrary, there is reason to suppose the very difficulties it had to encounter were no greater on the whole than excited to new enterprise and tended to the development of further improvement.

intelligence and inquiry which is so favourable to the development of improvement through the application of known principles. They were not contented with following old-established rules without being satisfied that they were formed upon rational data, and many practices in the detail of agriculture maintained by prejudice came to yield to the application of correct reasoning. The Highland Society's exertions, therefore, came now to bear with increased force; and as they were met by a more eager desire, both to communicate and receive information on the part of agriculturists, the sphere of the Society's operations were, about the middle of this epoch, very considerably extended. Its transactions, which had been published at long intervals, and which had reached only to six volumes of rather an inaccessible form, previous to 1828, were now given to the public quarterly through the medium, and as an appendage, of that excellent work "The Quarterly Journal of Agriculture," which at this time took the place of the old "Farmer's Magazine," a short time before discontinued. This proceeding has proved of inestimable advantage to agriculture, in disseminating more widely and expeditiously the many excellent and highly useful communications, on every branch of agriculture, which the liberal and increasing premiums of the Society have called forth. The aid of science has thus been more extensively called in, to assist in culture—new manures have been encouraged and extended—encouragement has been given to the application of more correct mechanical principles to the construction of implements—diseases of live-stock have been investigated, and thus mitigated or removed—experiments have been instituted which have given rise to greater economy in feeding—draining has been encouraged and extended—and there is no branch of rural economy which has not partaken of the benefits of the patronage and encouragement of this munificent Society. More especially, also, its care and interest came now to be given to the introduction and extension of improved descriptions of live-stock; and, in addition to the district shows, which were almost specially devoted to the improvement of the native breeds, the establishment of the grand shows held annually in the chief towns has tended to excite an interest which has, besides other considerations, been eminently conspicuous in spreading the taste for a finer and improved stock. In short, the attention and influence of this patriotic body being now extended principally to agriculture, it well merited the additional title which it has assumed, of "The Agricultural Society of Scotland." The Prize-Essays and Transactions of this Society, being now so easily accessible and quickly disseminated, as might be supposed, could not fail to create a great interest in so intelligent and well-educated a class as farmers had now become; and the effects were soon discernible in the perfection and scien-

tific manner, in which many agricultural operations came now to be carried on in Scotland.

Chemistry and mineralogy have been called in to assist in the promotion of new modes of improving the nature and capabilities of the soil, while botany and vegetable physiology have been, in many instances, brought successfully forward to point out a method of cropping suited to surmount obstacles which have interfered with the success of certain crops. In short, if we were required, in one word, to characterize the present state of agriculture, from that of former periods, we should say, that it is now more pursued as a *science.* It is true all may not be regulated in their practice by original conceptions, founded on such high authority; but, from the general intelligence and acute observation which pervades the whole class, successful management is sure, at no very distant time, to attract imitators among those who may be less inclined to lead. The day, it is hoped, is now gone by when to the farmer can be applied with justice the obloquy of imperturbable and culpable adherence to antiquated practices; and he may now, we presume, fairly maintain his title to a share in the commendation, which justly belongs to the other industrial classes of this country, for activity and enterprise.

But, while the progress of improvement in agriculture has gone pretty steadily on to this result, its success has not been, as during the former period, so uniformly great; and its history in this respect displays a more chequered aspect. The great fall of prices which took place about the close of the war created a reaction, which soon told with severity upon a numerous class of agriculturists. Rents, which had attained an unnatural elevation, from the confidence inspired by so long a continuance of high prices, occasioned a great embarrassment to the majority of tenants. Hence a period of severe agricultural distress early began to manifest itself. The price of wheat, which for the previous five years had averaged upwards of 108*s.* per quarter, fell in 1815 to 53*s.* 7*d.*, and in the January of the following year to 52*s.* 6*d.*; and, although there was a revival of prices to a considerable extent, owing to the deficient harvests of 1816 and 1817, Scotland did not participate much in this improvement, as that deficiency arose from a cause—the lateness of the seasons—which materially influenced the productiveness of the crops in this part of the kingdom. The crop of the following year proved, indeed, productive; but, a different result being early anticipated, and alarm being easily excited, from the previous short supplies, an unprecedentedly large importation, amounting to upwards of 1,500,000 quarters, in this year, depressed prices again beyond the fair ratio, and occasioned such an accumulation as operated to keep grain under a remunerating price for many years. A severe check was thus given to agricultural

energy in many places, generally most felt in those districts where operations had been carried on to such perfection as to induce a freer recourse to corn-crops than was consistent with the ultimate preservation of the soil in good heart. In East Lothian, for example, at this time, much distress prevailed, until the high rents prevalent there were adjusted according to a principle having reference to the comparative value of grain at this time with that which existed at the entry to the farms. In other cases, leases entered upon during the prevalence of high rents were fast lapsing; and under a more equitable adjustment of rents a fresh spirit of enterprise ensued, which, favoured by the very difficulties which now presented themselves, excited to new exertions, and gave rise to new modes of management, which proved successful in mitigating the threatened distress, and ultimately tended to the advantage of both the occupier and the land. We allude to a more extensive system of grazing, which now became prevalent in some of those districts hitherto entirely, and perhaps, under any circumstances, too exclusively devoted to the production of corn-crops.

The agriculturists of Scotland partook also in the depression which characterised the state of the other industrial classes of the kingdom in 1824-5; but since that period, though certainly not at all times in a flourishing condition as respects their finances, they have gone on in a steady progressive state of improvement, and have added by their economy, ingenuity, and intelligence greatly to the increased resources of the country. It is by this greater productiveness that they have been enabled so well, in spite of a much lower range of price compared with rents, to bear up against a course of circumstances which otherwise must have overwhelmed them; and we need no other proof of the further improvement in Scotch agriculture, since the period of the war, than a comparison of the rents during the war and subsequently, with the now decreased value of agricultural produce. It is to be regretted we have no means with perfect precision accurately to know the comparative amount of these rents, but it seems very generally to be allowed that the decline which took place in the first ten years of this period has been very materially made up by the rise which has since occurred; so that the rental of Scotland, it is confidently assumed, may now be held equal to what it was in 1810.* The rents being, then, the same in 1810 and 1837, we find the average price of wheat and barley for ten years previous to these years respectively to stand thus:—

	Wheat.	Barley.
From 1800 to 1810	81*s*. 2*d*. per qr.	41*s*. 5*d*. per qr.
,, 1826 1837	55*s*. 8*d*. ,, ...	31*s*. 4*d*. ,,

* M'Culloch's Statistical Account, vol. i. p. 539.

Butchers' meat and wool, we have reason to believe, were also considerably higher during the former period: so that, assuming agricultural capital to have yielded an equal return at the two periods, we are compelled to the conclusion, that in productiveness our fields have nearly doubled since the beginning of the century. Now, we know that, though this preliminary assumption is far from the truth, it would be much more incorrect to suppose that the whole apparent difference which this article of price exhibits found its way into the pocket of the farmer of the former period: on the contrary, we believe that the great proportion of this difference of price is made up to the farmer of the present day by increased productiveness, perhaps, to the amount at least of 70 per cent.

This result, it is confidently presumed, has been chiefly brought about during the period now under consideration, and has been mainly effected by the judicious intermixture of the feeding and grazing of live-stock with arable culture; by which, not only has the soil been brought to a greater fertility when under culmiferous crops, but to produce all the additional live-stock now kept as clear disposable gain. To increase the amount of this live-stock has been the chief care of the successful farmer, and has led to many of the greatest improvements in the husbandry of modern days. The great extent to which draining, for instance, has been lately carried, in a great measure, is owing to the desire to produce an additional breadth of turnips, that more live-stock may be maintained. Foreign manures have also been introduced, and liberally employed with a like end; and even the climate has acquired great amelioration from the extensive plantations which have been executed chiefly with a view to afford shelter for sheep. Of these improvements it may be right to say something in detail.

Draining has been much more extensively and systematically performed during the whole of this period. In the earlier part of it, that system had been in general use which had for its object the intersecting of springs, or of the oozings of under-water forced from a higher surface. This was accomplished by means of drains cut generally at right angles with the line of the ridges, or across the slope of the ground, sufficiently deep to reach the porous stratum through which such spouts found vent; and the usual method was to form the line of drain immediately above that where the indication of superabundant moisture appeared, leading it off to the nearest open ditch. These drains are of various depths, according to the nature and distance from the surface of the strata in which the water is found, but four feet may be considered the ordinary extent to which they are carried; frequent wells or bores being added along the line of the drain, sometimes on Elkington's principle, to reach a pervious vent for

the water, or, where the drain has failed in every part to reach the porous stratum, to catch additional water to carry along its line. No materials have been found equal to stones for filling these drains, and the use of other substances has almost invariably been attended by ultimate disappointment. It was a common practice to make these trenches of a great width, and to fill them within a short space of the surface; but, besides that such drains gave occasion to too large a size of stones being used, and, by consuming also an unnecessary number, increased materially the expense, they were much exposed to accident, from being disturbed, and thus injured, by the plough. When properly executed, these drains are seldom made wider than ten inches at the bottom, when a regularly-formed conduit is held unnecessary; and in this case the stones are broken to not more than two pounds weight, carefully deposited with the hand, and being closely finished on the top with small broken stones, or rough gravel, and slightly covered with straw, they ought in no case to be filled nearer the surface than 16 to 18 inches.

Furrow-draining has also been extensively applied on the flat alluvial and thin clay districts of Scotland within this period, particularly in the districts of Stirling, Perth, and Ayrshire, where the liberality of proprietors has been, in many instances, very properly called into exercise to assist in an operation which can only be properly effected through such instrumentality. These drains have been generally applied to every furrow where the ridges are wide, and their common depth is from 24 to 30 inches. Tiles have been extensively used as the medium of carrying off the water in such drains; and, of late, from the greater cheapness with which they can be furnished—since the application of machinery in their manufacture by that eminent friend to agriculture, the Marquis of Tweeddale, and some other ingenious individuals—their use has been very generally extended. More particularly we ought to mention, that, within these very few years, numerous tile-works have been brought into operation, with this view, in East Lothian, where this system of draining, and that to be immediately noticed, have been very extensively practised, and are in daily-growing repute.

The system to which we allude, and which has latterly found much favour, is an improvement upon this last, perfected and first extensively practised in Scotland by the ingenious Mr. Smith, of Deanston in Stirlingshire. This intelligent and enterprising gentleman has, by means of this system of draining, and the free use of the subsoil-plough—of which useful implement he is also the inventor—converted a formerly barren, cold, and impervious soil into useful turnip-land. His example has been laudably followed by others; and, although the system has not yet had time to be

very extensively applied, it is now happily in a fair way of quickly working a revolution in many parts of Scotland, rendering land, which was scarcely worth 10*s.* an acre, equal to double and treble its former value. The object of this effectual method of draining may be said, in comparison with that first noticed, to be rather to prevent the pernicious effects of superabundant moisture than to remove the cause of it; and the principle of the system has been described by its author as "the providing of frequent opportunities for the water rising from below, or falling on the surface, to pass freely and completely off;" and therefore he has appropriately designated it "the frequent drain system." However desirable it would be here to give a full detail of the mode of operating so important an improvement, it would be inconsistent with the design of this essay, and occupy too much space, to enter upon it with such minuteness as would be available for practice. We must therefore be contented with referring to the very clear and intelligent description of the system by its author, as published in a cheap form by Messrs. Drummond, of Stirling. It may be enough at present to say, as descriptive generally of the manner of executing the work, that after main covered drains of greater depth have been carried along the hollow parts of a field, into these are conducted narrower and shallower parallel drains, filled with small stones, at regular distances, varying from 10 to 40 feet apart, according to the nature of the soil. These are directed to be carried "*throughout the whole field, without reference to the wet or dry appearance of distinct portions;*" and it is recommended to lay out the ground, after the operation is concluded, without ridges. The expense, as given by Mr. Smith, is estimated from 3*l.* to 12*l.* per acre, according to the frequency of the application; and as, to be substantially performed, it is an improvement which requires the assistance of the proprietors of the soil, it is to be regretted they have hitherto in so limited a number applied themselves to the extension of an improvement so eminently calculated to effect a change so devoutly to be wished, as fraught with such important consequences to the country.

A modification of this principle has been, in some lands, successfully employed, and we have no doubt there are many instances where every object may be gained, and a saving of a great part of the expense effected, by a judicious limitation of the general plan laid down. In the same way the subsoil-plough has, we are inclined to think, been in frequent instances too indiscriminately applied, and an equal or better effect, it is presumed, would be produced on many soils at much less expense by a thorough application of the common plough with additional strength, so as to bring at once to the surface a substance which, being amalgamated with an impoverished or weak soil, would wonderfully assist its

ertility. We would not be thought to wish in any way to detract from Mr. Smith's invaluable discoveries by these observations, for his great merits are not to be lessened by the misapplication of his principles; and if it be the duty of the state to reward those who have accomplished, by their genius, great public improvements, we know no individual who deserves so well of his country.

Manures.—At the beginning of this era scarcely an instance was known of the application of foreign manures in Scotland; or, if known, such instances were merely regarded as subjects of curious experiment. Within the last ten years, however, these have been gradually gaining greater favour, and are now, to the great benefit of agriculture, extensively applied. Bone-dust, particularly, has given opportunity to the culture of a great additional breadth of turnips; and, by permitting the application of a larger supply of the manure of the farm to the lands nearer the homestead, has still more improved the quality of this fundamental crop. It is almost unnecessary to say that there is scarcely such a thing known in Scotland as broad-cast turnips; and the facility which bone-manure affords to the expeditious completion of the drills is not one of the least of its advantages on a turnip-farm, where the labour is necessarily hurried at so important a season as turnip-seed time. Hitherto it has been nearly to this crop alone that bone-dust has been applied; and the quantity generally found sufficient for a full crop, on light sandy soils or gravel—to which this manure is given with great success—is 16 bushels per English acre.

Rape-dust has not been found so generally to suit the soils of Scotland as a manure, and its greater expense has also tended to limit its application in any degree equal to that of bone-dust. In those lands where the latter has not been found productive of the expected advantage—generally greasy soils—the former has sometimes proved of considerable efficiency in raising green crops; and, in some cases, a mixture of the two, in nearly equal proportions, has been found to suit where either, separately, had proved comparatively ineffectual. The crop to which rape-dust, however, is generally applied is wheat, and the quantity given is from 12 to 14 cwt. per English acre.

It is considered again unnecessary to go over the usual rotations, as those stated as having become prevalent during the last period characterises equally the present general practice in this respect. The great improvement which has taken place of late years in the mode of cropping is distinguished rather by a desire to be guided by the application of a sound discrimination than by following any fixed rule. It is no doubt still held bad practice to take two corn-crops in immediate succession, and only to be justified by the application of a large addition of manure; but the kind of crop

to be grown, under the particular circumstances of the state of the season or soil, can only be successfully regulated by judicious observation, and such corrections applied in the form of altered management as reason and experience may dictate. It is thus that barley or oats is frequently substituted for wheat, beans for turnips, when the latter have, in the previous rotations, proved perhaps unsuccessful; and it is owing to the operation of such principles that pease have been justly expelled from the course in Scotland, where good farming prevails.

Live-Stock.—It is almost unnecessary to allude further to the great extension and improvement in live-stock. Improved short-horned cattle are now to be found, in greater or less perfection, in all the lowland districts of Scotland, while in the middle and south-eastern counties they are to be frequently met with of equal symmetry and weight to many of the herds in the southern part of the empire. But it is chiefly in its extensive flocks of Leicester sheep that Scotland may now successfully vie with her southern neighbours. This excellent breed has now entire possession of all the arable districts in the south-east of Scotland, while it is rapidly being extended along the whole lowlands of the eastern coast; and indeed there is now no arable district, throughout the country, where they are not known to a greater or less extent. That in these circumstances there are not in Scotland, in greater numbers, such men as the Bakewells and Culleys of former days, is owing, perhaps, to so many possessing an equal degree of eminence for these improved breeds of live-stock; but it would be unjust not to mention the well-known celebrity of Captain Barclay Allardice, of Ury, and Mr. Watson of Keilor, who, in the "far North," have produced a breed of stock which has successfully competed with the best of England.

Nor must we omit to mention the great success which has resulted from the extensive introduction of the Cheviot breed of sheep into the Highlands of Scotland, which has now so rapidly increased, that it is computed upwards of 100,000 sheep, and 100,000 stones of wool are annually disposed of at Inverness fair, the great proportion of them Cheviots; and from Sutherland alone it is estimated that 40,000 of this breed and 180,000 fleeces are annually sent to the south;* and all this has been effected without materially, it is supposed, having diminished the value of the export of black cattle from the Highlands. It should also be stated that Scotland, besides supplying herself with a sufficiency of excellent farm-horses to meet her extended cultivation, continues to export a few to the neighbouring part of the

* Anderson's Highlands.

kingdom, from the western counties. In most arable farms one or two horses are bred with a view to maintain the strength of the farm, but seldom is the success equal to this object entirely, and recourse is had to the pastoral districts to assist this deficiency. Perhaps there is no part of economical management to which the agriculturists of Scotland are less attentive than to the ordinary maintenance of the farm-horse; and although some improvement has taken place of late years, with a view to save the great consumption of corn which there so generally obtains—by substituting chopped hay, straw, and steamed food of a more economical kind—an extension of this practice is much required, and ought to form a matter for encouragement.

Implements.—The correct application of mechanical principles to the improvement of agricultural implements, which has been eminently encouraged by the Highland Society, has been very conspicuous of late years, and nearly every operation in husbandry has been brought to display the effects of a more efficient adaptation of these principles. Further economy of labour has been obtained by greater attention to the right adjustment of the force of traction; and a general neatness and precision, through the introduction of better implements, now characterize the detail of many operations which were wont to be very imperfectly performed. It cannot be expected that we should particularize these, but it may be right to state that the very general application of steam on large farms to the threshing-machine has given rise to the introduction of more powerful and increased machinery, which has very materially increased and perfected its efficiency, and rendered its services more than ever appreciated. We wish we could see a reaping-machine brought to equal perfection, for, as it is, no implement of this description has been produced which gives promise of soon meeting general regard. It may be mentioned that the greater part of the crop in Scotland is cut with the teethed sickle, or single-handed scythe-hook, and though in many instances different descriptions of double-handed scythes are in use, and have of late been further introduced, these do not appear to execute their work so well as to justify the general resort to a mode of cutting which is only less expensive as regards wages.

The progress of the subsoil plough is steadily advancing, and this implement is to be found still, however partially, in exercise in almost every district of Scotland, so that the instances of the beneficial effects of its use are sufficiently spread to insure—with the additional incentive supplied by the premiums of Agricultural Societies—the rapid extension of so effectual a mode of improving thin soils. But, in the mean time, a great deal has been done by the more general practice of substantial and deep ploughing, to

which the introduction of the subsoil plough has mainly contributed. The ordinary operation of ploughing has been of late years infinitely improved, and great additional fertility imparted to the soil by raising liberally a fresh substance to the surface. This has been accomplished, in most instances, by the application of three or four horses to the common plough in executing the winter furrow, and even with the ordinary power of two horses, much more substantial work is performed, so that a depth of from 10 to 12 inches is in this way frequently obtained.

Produce.—With respect to the effects of all these improvements upon productiveness, we have already alluded to the general results in a comparison with rents; and there are so many circumstances which go to affect particular crops, besides the condition of the soil, that it is in vain to attempt to give a precise statement of the actual increase upon a given species of crop induced by improved fertility. We know, however, that this increase cannot fail to be very considerable, other matters being equal, and we have no doubt, in a comparison of the amount of grain produced upon an inferior description of land, managed after the general fashion of the present day, would be double what it was under the ordinary management of the beginning of this period. On the finer descriptions of lands of course this increase is very much less, and in some cases scarcely perceptible. Thus the average of good land may be now assumed giving this result:—

Wheat	30 to 32	Bushels	for English	statute	acre.
Barley	40 to 44	,,		,,	,,
Oats	46 to 50	,,		,,	,,

The average produce of the lighter lands, where draining has not been much required, may be stated as now—

Wheat	22 to 26	bushels	per acre.
Barley	34 to 38	,,	,,
Oats	36 to 43	,,	,,

But it is in the thin damp soils now drained that the great additional increase has been obtained, and whereas they were formerly unproductive and precarious under every crop, they may safely be held as yielding now a greater return of wheat than the last description of soil alluded to, and fully an equal produce of oats and barley.

But besides this greater productiveness in ordinary seasons, there is every reason to believe that recent improvements have been highly instrumental in resisting the influence of late and unfavourable weather; and it consists with our experience that some locali-

ties in Scotland have, from the effects of draining and shelter, and these not very perfect, acquired an earlier maturity of at least ten days in average years.*

The reproductive powers of the improved system of agriculture, in comparison with that effected by the method of treatment pursued at the beginning of this inquiry, is no less conspicuous, and is also worthy of notice. Take, for example, the case of a farm of 100 acres, after the fashion of 1784, under its rotation of 1st, fallow; 2nd, wheat; 3d, barley; 4th, oats; 5th, pease; and similar land, now under a system of 1st, turnips; 2nd, barley or wheat; 3d, clover (hay); 4th, pasture; 5th, oats; and estimating the weight of straw of the crops of both periods alike at 3 cwt. per qr., according to the estimated produce stated above, we appear to be justified in adopting the following result:—

		Tons.	Tons.
Crop of 1784	80 acres grain, 4 qrs. per acre 320 qrs. at 3 cwt. per qr.		48
Crop of 1837	40 acres grain, $5\frac{1}{2}$ qrs. per acre 220 qrs. at 3 cwt. per qr.	33	
	20 acres hay, 30 cwt. per acre	30	
	20 do. turnips, 20 tons, do.	400	
			463
Difference in materials for manure			415

Thus, without taking into account the greatly less quantity of straw disposable for dung in the former case, from the want of other fodder, we have an increase of reproductive materials equal to nearly ten times the amount of the first period.

In estimating the total quantity and value of agricultural produce in Scotland, Mr. M'Culloch,† in his Statistical Account of the British Empire, gives a sketch of the "distribution of land" at the present time, compared with that afforded by the General Report of Scotland (published in 1814), and thus states the matter:—

"This is a subject as to which the real information at our command is as limited, in respect of Scotland, as of the other divisions of the empire. According to the statistical tables in the General Report of Scotland, the arable land is estimated at 5,043,450 English acres. Of these the proportion in grass is estimated at 2,489,725, leaving 2,553,725 in tillage, which is supposed to be distributed as follows:—

* See p. 34. † Vol. i. p. 537.

	Acres.
Wheat	140,095
Barley	280,193
Oats	1,260,352
Rye	500
Beans and Pease	118,000
Potatoes	80,000
Turnips	407,125
Flax	16,500
Gardens	32,000
Fallow	218,950

"But a large extent of waste land has been brought under cultivation during the last twenty years; and we are also satisfied, from the greatly increased consumption of wheaten bread in Scotland, and other circumstances, that the quantity of land assigned to the growth of wheat has increased both absolutely and relatively. In our view of the matter, the distribution of the land in tillage would be more correct, were it made as follows:—

	Acres.
Wheat	220,000
Barley	280,000
Oats	1,275,000
Beans and Pease	100,000
Potatoes	130,000
Turnips	350,000
Flax	15,000
Gardens	32,000
Fallow	150,000
Total	2,533,000"

Now, it humbly appears to us that besides that, in this distribution of the land in tillage, "the large extent of waste land brought under cultivation during the last twenty years" has been omitted to be added, the distribution itself—allowing that it was relatively correct in the first instance—has not been sufficiently changed to meet the altered circumstances. The breadth of turnips, especially, has been diminished, in place of being materially increased. But it is difficult to understand upon what principle these statements have been framed, as, in order to agree with any known mode of culture, the grass being excluded, it is necessary that the fallow and green crops stand in proportion to the corn crops as one to two, unless, indeed, we suppose a repetition of white crops, which cannot now surely be contemplated. Taking, then, the total number of arable acres as here mentioned, we should be inclined to adopt the following distribution as nearer the truth:—

	Acres.
Wheat	330,000
Barley	410,000
Oats	940,000
Turnips	420,000
Fallow	170,000
Potatoes	140,000
Beans and Pease	100,000
Flax	10,000
Gardens	33,000
Total	2,553,000

Again, it may serve to afford some idea of the extraordinary increase and improvement of live-stock in Scotland throughout the whole period of this survey, and the extent to which the feeding process has been carried, to state that, while in Glasgow, in 1763 —though that city had then a population of 30,000—the slaughter of cattle for the supply of the public market was wholly unknown, the number of sheep and oxen there required now does not materially differ, in proportion to the greatly increased number of its inhabitants, from that furnished to the city of London.* In the other large towns of Scotland, there is reason to believe, a demand in nearly a similar ratio exists. Such has been the extraordinary improvement in the condition and habits of the people! The whole of this supply of butchers' meat is now furnished to Scotland by her own agriculture; and, besides the large exportation of lean stock to the neighbouring kingdom, a very considerable number of fatted animals are continually being sent thither from the north, east, and south of Scotland,—an amount which has been lately much increased, from the greater facilities afforded by steam-navigation.

It now remains that we endeavour to confirm, as has been required, the above account of the extensive and rapid progress which has distinguished the agriculture of Scotland during the last sixty years, by a reference to the "description of improvements which can be proved to have taken place in a specified district."

The tract of country selected for this purpose is that situated in the eastern part of Roxburghshire, extending along the banks of

* "In 1831 the population of London amounted to 1,472,000, and, at an average of three years ending with that time, 156,000 head of cattle, and 1,238,000 head of sheep, were annually sold in Smithfield market."—*M'Culloch's Statistical Account*, p. 586.

the Tweed and the Teviot for about ten miles at and adjoining the confluence of these rivers, having the town of Kelso for its centre, and embraces the parishes of Ednam, Sprouston, Linton, Kelso, Makerstom, Roxburgh, and Eckford. Besides that the writer is, from residence, and intimacy with the great majority of the tenantry, and from possessing in the heart of it a farm of nearly 1000 acres, peculiarly conversant with this district, it is from its perfection in agriculture, as well as from its varied surface and variety of soil, specially appropriate for such an illustration. In the first respect, indeed, it will not be considered, by those who are familiar with the mode of culture and appearance of this part of the country, that we say too much when we affirm that, in the skill and efficiency of its husbandry, and in the fertility of its fields, it is surpassed by no district of the same extent in Scotland. Its whole area extends to upwards of 42,000 acres, the arable part being, with very few exceptions, subdivided into enclosures of from 20 to 40 acres, with substantial and thriving thorn-hedges, in some instances picturesquely ornamented with hedge-row trees. The general character of the soil is a free loam of various depth, composed of a rich sand or gravel upon an open subsoil, the surface being more aluminous in its nature as it partakes of the level of the rivers; the land lying upon the elevated slopes, apart from the rivers, is of a more cohesive nature, imparted chiefly by its resting upon a close retentive bottom. Again, as the country rises to the highest ridges, the soil is generally thin and of a vegetable or peaty substance, frequently incumbent upon a close and nearly impenetrable condensed sand and yellow clay, strongly impregnated with oxide of iron. A very general mode of culture is prevalent throughout the entire district, the leading characteristic being that of a rotation of five years. The far greater proportion of the soil being well adapted for the successful cultivation of turnips, that crop commonly forms the foundation of the course pursued; and perhaps there is no part of the island where the preparation of the soil for the raising of this valuable esculent is better understood, and where its cultivation is carried on with so much attention to cleanness and order. The drill system is universally prevalent. The drills range in extent from 26 to 30 inches, the medium of 28 inches being that generally adopted, the dung (previously well fermented and prepared by turning, or bone dust, as the case may be) being applied in the drill, with few exceptions, immediately before sowing. From the great breadth occupied by this crop, on many farms, the operation of sowing is frequently not concluded until the early part of July, and, in the majority of seasons, turnips sown, even at this late period, prove a valuable crop for spring food; but, in general, the best season for

sowing is considered to be, for Swedish turnips, during the last week of May, and, for the varieties of the white species, from the beginning until the middle of June. A half or three-fourths of this crop, upon the drier lands, are eaten upon the ground by sheep, the remainder being generally what is technically called *stripped* and carted home for soiling. The land is now ploughed as cleared; that part where the crop is early consumed being often followed by wheat, while the later-cleared ground, and by far the larger proportion of the whole, is reserved for barley. These crops are also not unfrequently drilled or ribbed, and the lands, being now sown down with grass-seeds, are depastured the two following years, a proportion, equal, perhaps, to a sixth of the whole, being the first year cut for hay. Oats are almost the invariable crop which follows, when the pasture-lands are again subjected to the plough, although, upon some fine haugh or water-side land, wheat has been occasionally grown at this stage of the course with some success.

This concludes the rotation—turnips again following; and no manure of any kind is applied to the intermediate corn-crops, even when it has been thought advisable to take a wheat-crop in the last of the course.

The above is given as the general mode of management throughout the district, but, as may be supposed, there are many exceptions to the uniform practice of this course; although there is little doubt that, for a period of any considerable extent, where there is no access to an extra supply of manure, the grazing for two years will be found to prove ultimately the most profitable system of occupation on those soils not of the best descriptions. On much of the lands of a first-rate quality, or of a stronger nature, a four-shift rotation is pursued, while a plain fallow is sometimes adopted on the latter description of soils, in the room of a turnip-crop.

This mode of management now extends over nearly 35,000 acres of this district, about 2000 acres of the remainder of the whole being occupied in woods and plantations, and a little above 5000, chiefly on the higher lands, as sheep-pasture.*

The extent annually in corn is thus about 14,500 acres, 13,300 in artificial grasses, and upwards of 7000 in turnips, potatoes, and fallow, in the following proportion:—

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* New Statistical Accounts of Scotland, Nos. V. and XIV. For additional valuable information of this kind, the writer has been much assisted by the Report of the sub-committee (of which he formed one) of the Border Association for the encouragement of agriculture in reference to the Berwick and Kelso railway. Kelso, 1836.

Turnips . . .	6000
Fallow . . .	700
Potatoes, &c. . . .	550

In the latter part of the last century, previous to 1795 at least, a great part of this fine district was unenclosed, and excepting the better description of land upon the immediate vicinity of the rivers, exhibited the dominion of the plough, in irregular and detached patches, selected according as the prejudice or discrimination of the occupier dictated, the intermediate portions being very generally devoted to grazing cattle, which were put under the charge of a herd to prevent their trespassing upon the divisions set apart for corn.

The meagre and imperfect statistical information of the period, as regards agriculture, affords no complete account of the proportion of land under cultivation in this district at that time; but there is every reason to believe, from the information we have been able to find, that in 1790 it did not amount to one-half of the whole extent. For instance, in the parish celebrated as that in which Mr. Dawson had early introduced and so extensively practised the turnip-culture, no greater progress had been made at that time than to the extent of two-thirds of the present arable land, or to less than a half of the whole area of the parish; and since a very imperfect mode of a six-shift rotation then generally prevailed, as the most favourable in the district, of fallow and turnips, wheat, pease, barley, clover, and oats; and we are assured that not even in this favoured spot did the breadth of turnips amount to more than a half of the whole fallow break, a tolerably correct estimate may be afforded of the distribution of the crop at that time. And, in now giving a comparative view of the two periods, we have, in the first, been guided by a reference to the average systems pursued, and other sources of information,* rather than confined ourselves to the data alone afforded by the rotation above quoted.

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* The distribution of the corn-crops in the whole county is thus given in the survey by Dr. Douglas in reference to 1784-6:—

Oats . . .	50,030	Wheat . . .	5,741
Barley . . .	14,763	Pease . . .	8,203

And the proportions are thus varied for 1796:—

Oats . . .	41,008	Wheat . . .	9,842
Barley . . .	16,404	Pease . . .	6,562

'General View of the Agriculture of Roxburghshire,' p. 79. By the Rev. R. Douglas, D.D., Galashiels. Edin., 1798.

1784–94.	Acres.	1837.	Acres.
Oats	7,820	Oats	7,044
Barley	3,260	Barley	4,624
Wheat	1,440	Wheat	2,820*
Pease	1,480	Clover and pasture. . .	13,249
Clover	3,500	including 2,600 hay.	
Fallow	1,750	Turnips	6,000
Turnips, &c.	1,750	Fallow	700
		Potatoes and beans .	544
	21,000		
			34,981

But from the system of repeated corn-crops, which distinguished the former period, the near approach of the *extent* of surface in corn does not seem to exhibit so great a disproportion, at first sight, as might have been apprehended; and it is only when an estimate of the *value* of the produce of the two periods is exhibited that a just conclusion is arrived at, thus:—

Acres.	1784–94.	£.
7,820	Oats, 30 bushels per acre, at 3*s*. . . .	35,190
3,260	Barley, 26 ,, ,, 4*s*. . . .	16,952
1,440	Wheat, 18 ,, ,, 6*s*. . . .	7,776
1,480	Pease, 10 ,, ,, 5*s*. . . .	3,700
3,500	Clover . . . . at 4*l*. per acre	14,000
1,750	Turnips, &c. . . . . 4*l*. ,, ...	7,000
		£84,618

Acres.	1837.	£.
7,044	Oats, 40 bushels per acre, at 3*s*. . . .	42,264
4,624	Barley, 36 ,, ,, 4*s*. . . .	33,292
2,820	Wheat, 24 ,, ,, 6*s*. . . .	20,302
2,600	Clover . . . . . at 6*l*. per acre	15,600
10,695	Pasture . . . . . . 2*l*. 10*s*. ,, ...	26,622
6,000	Turnips . . . . . . 5*l*. ,, ...	30,000
544	Potatoes, &c. . . 8*l*. ,, ...	4,352
		£172,432 †

* The *average* proportions in wheat and barley have here been assumed, rather than that of this particular time, for, from the comparatively low price of wheat subsequent to 1835, much less of that grain than usual had been sown for a year or two at that time. This is now again assuming its natural level.

† This estimate, we are aware, produces a very considerably higher result than would be exhibited by adding together the estimates of the produce of the separate parishes as given in the New Statistical Account, but these bear some marks of incorrectness—arising probably from some misapprehension in not distinguishing, in the returns to the clergymen, the *disposable* from the *gross* produce—which, it was thought, rendered the above necessary, and to be preferred.

It is thus in the great additional extent of turnips, and improved pasturage, that the extensively-increased productiveness of the modern system eminently consists. Accordingly it is in the article of live-stock that the wonderful change is chiefly remarkable. There is here the same difficulty in obtaining a correct amount of the number of live-stock maintained within the district at the early period of this comparative view: nor is it, there is reason to think, in increase of numbers, so much as in weight or quality, that the great difference would appear, had we right data to form a complete estimate. In the first epoch the Cheviot breed of sheep prevailed throughout the entire district, saving, perhaps, a few of the cross of the indigenous breed already alluded to, kept upon improved lands; and it appears, from Dr. Douglas's Survey,* that even in 1796 there were no more than "five or six small flocks of the Dishley breed kept by gentlemen in rich enclosures, and by one or two farmers in the arable district." Now, the whole of the district under review, excepting a very inconsiderable portion in the highest ridges of one of the parishes, is possessed by this excellent breed of sheep; and the pains and expense bestowed of late years in their culture and improvement have justly established a character for this part of the country for its breed of Leicesters, which is surpassed by that of no other district in Scotland; and it is not, perhaps, saying too much to add, that, in this respect, it would successfully vie with many of the highest note in the southern parts of the kingdom.

It may be right to give a sketch of the mode of management and disposal of this stock, here so celebrated. On nearly all farms of any considerable extent what is called a breeding-stock of these sheep is kept, and the system pursued is generally the following. From the ewes three successions of lambs are taken, the dams being sold off at the close of their third breeding-season, or when four and a half years old. In general, the whole produce of these ewes is retained upon the farm on which they are bred, a proportion of the ewe-lambs, when gimmers, coming in to take the place of the old ewes sold in each year. The wedder-lambs, again, are disposed of as fat, many of them immediately after being deprived of the first fleece, and the remainder after being fed on turnips, in the winter or spring of the second year. Not unfrequently, however, upon such farms where a large proportion of turnips cannot be raised, the whole wedder-lambs, and sometimes part of the ewe-lambs, are disposed of at weaning-time; and those ewe-lambs kept beyond the number required to maintain the complement of the year are sold when gimmers, generally at about eighteen months old. These young sheep, being thus so early matured for the

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* General View, p. 167.

butcher, are maintained from their earliest time on full feed, it being a great object to prevent them losing any of the condition they generally possess when taken from the ewes. With this view, also, they are early put upon turnips, as it is very desirable they should be well acquainted with this their essential means of support, previous to any failure in the nutritious properties of the grass, or the occurrence of severe weather. When either of these events takes place, the turnip forms the chief or only source of their subsistence.

To the young stock intended to be kept for breeding fewer turnips are commonly allowed, although they are seldom, during any part of the winter, entirely deprived of this useful assistance. The ewes, having at this season the range of the whole pastures, are only allowed auxiliary food during the severity of a storm and in hard winter weather, until towards the approach of the period of lambing, when a proportion of turnips becomes indispensable to maintain them in sufficient condition to bring them well through this critical and interesting season. In general more sheep are fattened than are bred in the district.

The cattle stock of the district may be said properly to consist of the short-horned, or Teeswater breed; at least, great pains are taken to obtain that admired breed in as pure and improved a state as it can possibly be produced; and it must be admitted that, in not a few hands within the bounds included in this review, are to be found some of the finest specimens of short-horns of which Scotland can boast. The liberality and exertions of the Border Union Agricultural Society, whose annual exhibitions are held alternately at Kelso and Coldstream, have undoubtedly contributed largely to effect this end by cherishing and exciting a spirit of praiseworthy rivalry in this important branch of rural economy, which has been productive of universal benefit. The premiums paid by that Society, for bulls and Leicester sheep, annually, amount to upwards of 150*l.*; and by this liberality the Society has succeeded in bringing forward a display of these animals which, it is confidently presumed, is not equalled at any similar exhibition in this part of the island.

Although not entirely a breeding district for cattle, a considerable number are reared within its bounds, it being pretty generally the custom that a few calves are raised, perhaps, upon an average, about two to the hundred acres. These are grazed and retained upon the farm until fed off, commonly at three years' old, although, by forcing, or being kept on the best food from their earliest age, they are not unfrequently prepared for the butcher at the conclusion of their second year; and it is not uncommon to see animals of this age produced at the Kelso spring market of sixty stones' weight. Besides, additional cattle are bought in lean

for feeding; and the number fully fatted and annually sold, almost entirely for the English markets, cannot be estimated at fewer than 1000, at an average weight of 55 stones each. The feeding of cattle was not entirely unknown in this district in the early epoch of this survey,* but it may be fairly assumed the quantity did not at that time reach to a fifth part of that just mentioned.

Estimating from the very limited information to be gathered from the statistical accounts of the parishes comprehended in this district,† it would appear, in numbers, that the quantity of sheep maintained at the two periods, respectively, is as about three to four; while the weight in the present time cannot be taken at much less than double that of the former period. Exclusive of a considerable number of sheep that are brought into the district to be fed on turnips during the winter months, the number of Leicesters we think we may assume, from personal knowledge and such information as we have access to, to be maintained now throughout the year, cannot be less than 25,600. Of these somewhat more than the half, or 14,500, are disposed of annually; and the quantity of wool produced has been estimated at upwards of 5100 stone.

Under the former system we may conclude that not quite 20,000 smaller sheep were maintained; and, allowing for a proportion being of a better description, it may fairly be estimated there would not be greatly above a third sold in each year, or say 7000, of such comparative weight, as to cause the produce in mutton certainly not to be fairly considered more than a fourth part of the result of the yield of the present time. In wool the deficiency would thus be equal to a half.

Rental.—The information contained in the statistical accounts of the two periods does not afford materials to enable a comparative view of the rents of the whole district to be given; for while, in the records of some of the parishes, we have the rental of one period shown, it is withheld in the account of the next. In one parish only we have the difference in the two periods distinctly stated; and this exhibits a contrast which we have no doubt may be taken as a fair criterion of the whole. In 1791, the real rent of the parish of Eckford is stated as having been 3699*l.*, while at the present time it is 8676*l.*‡ In corroboration of the view that these figures afford data for a tolerably fair estimate of the increase of the rental of the district, it may be mentioned that one of the finest farms within its compass, on the opposite extremity to the

* Wight's Survey, vol. ii. p. 259.
† Statistical Account of Scotland, vols. iii. and xix.—Linton and Roxburgh.
‡ New Statistical Account of Scotland, No. XIV., p. 230.—Roxburghshire.

parish just alluded to, which in the first period was let for 1200*l.*, was the other day taken on a lease at 2650*l.*, and had been previously rented at upwards of 2700*l.*

The sale of some estates within the district, at this time, also exhibit the greatly improved value of land at the different periods. The fine estate of Ednam, which sold in 1787 for 31,500*l.*, was purchased by Lord Dudley and Ward, in 1825, at 105,000*l.* A small property in the neighbourhood of Kelso, which was disposed of, a few years subsequent to 1780, at 7500*l.*, brought last year 22,500*l.*; and without enumerating further, these instances may be held as affording a fair example of the effects of improved culture in raising the value of land in this quarter, as well as throughout the other districts of Scotland, over which the plough has been so efficiently extended.

General Improvements.—Lime continues to be very liberally applied to all the soils of this district, and although this valuable stimulant is not to be obtained nearer than at an average distance of twenty miles, it is believed there are very few acres subjected to tillage within its whole limits which have not once, at least, within the last forty years, been brought under its influence. But the chief improvements which have of late done so much for this part of the country (and it is conceived enough that it should be now mentioned) have been effected by a more extensive system of draining, and the free use of bone manure. From the tendency that the prevailing practice has to induce a general system, a considerable breadth of land, for many years past, has been applied to the growth of turnips in a very unsuitable state for this crop; and consequently there is not now so great an addition to the extent of ground thus occupied, as that the soil being rendered suitable by draining, the quality of the crop is so very materially improved. Nevertheless, something also has been effected in extent; perhaps to the lessening of a plain fallow by about a third of the ground thus occupied ten years ago. But it is in the increased weight since this time that so much has been accomplished; and although the frequency of the drains is still far from being sufficient, in almost every instance, still enough has been done to show that there is not an acre of land in the district which may not be rendered suitable for turnips; and moreover that these damp lands, when effectually drained, are, for some time at least, (the limit of which has yet to be proved,) eminently calculated to produce a large, vigorous, and healthy crop. The writer has himself effected a considerable improvement in this way, by which he has, with advantage, substituted turnips on his fallow break to double their former proportion; and has even in this wet season nearly fifty acres, a very full crop upon land never before subjected to this system. His draining opera-

tions however, he must acknowledge, as compared with the present practice, have been very far from perfect; and from the now limited term of his lease, he has not considered himself further warranted to incur the large outlay, which the adoption of the more perfect system recently introduced would necessarily involve. But he can refer with confidence to the complete success of such improvements to his spirited and intelligent immediate neighbour, Mr. Roberson of Ladyrig, who has lately renewed his occupation upon an improving lease of twenty-one years, and who by the adoption of Mr. Smith's system of drainage is fast proceeding altogether to change the character of the greater part of his farm. In reference to the soil thus alluded to, and occupied by the writer, it may be mentioned that in the Statistical Account of the Parish of Kelso* (1794) it is stated, as descriptive of this land, "that it is in general thin and wet, and the bottom is a red clay: here the crops are generally three weeks later than in the vicinity of the rivers." That such is a correct account of matters at this period we have little doubt, as the effects of the writer's partial improvements since 1824 have been such as to produce an earlier maturity to the extent of at least ten days; and it may be confidently asserted there is now little palpable difference between the harvesting of the crops here, and those of the land along the river sides.

The more extensive application of bone-dust has also assisted eminently in improving the quality of the turnip crops, and thus tending to the general increased fertility of the soil. In place of, as formerly, drawing out the farm-yard dung so as to extend over the whole fallow break,—by which practice no part was sufficiently manured, and a secondary crop the result—the application of bone-dust to a portion admits of a concentration upon the nearer lands of the heavier material in sufficient quantity, so that the farmer is enabled to act upon the golden maxim of good husbandry, "never to sow a crop where there is not condition in the soil to grow it luxuriantly." The consequence is that in place of the turnips being worth 3*l.* an acre, they are now more frequently worth 6*l.*; and of this benefit all the after crops partake in relative proportion.

In conclusion, we cannot resist the opportunity of again adverting to the duty which is, at this crisis, specially incumbent upon the proprietors of the soil to come liberally forward, mutually to co-operate with the tenantry in promoting the extension of those improvements which have been proved to be so eminently calculated to advance the prosperity of the country.

At no period in the history of agriculture have the benefits derived from a given species of amelioration been so obviously conspicuous, nor the expense in proportion to the result so capable of

* Sir John Sinclair's, vol. x.

a precise estimate, as that which is exhibited by the "frequent drain system." It, however, involves an outlay which few tenants have the means perfectly to accomplish, and, even if within their reach, it is not an improvement of such a nature as, it is feared, will be efficiently performed by a possessor upon a limited tenure; and hence, besides that discredit, from partial failure, owing to incomplete work, attaches to the principle, the operator is deprived of the full benefit of the melioration. As detailed by its ingenious author, it is a permanent improvement, and, as such, should be performed at the expense and under the express superintendence of the proprietor. It has been proved eminently calculated to raise the value of the land, and thus its tendency is to increase the revenue of the proprietor; and as there is no judicious tenant who will refuse to pay a full per centage for such an expenditure, immediately upon its being applied, there is at no time any sacrifice required, while the ultimate result cannot be questioned. We earnestly, then, impress upon landlords to give this scheme due consideration, as that by which they shall best promote their own interest; and by strenuously acting to advance the more rapid extension of a system calculated in so high a degree to increase the fertility of the soil, enable our agriculture to keep pace* with the enlarged demands of a prosperous and increasing people.

A Practical Farmer.

October, 1838.

* The estimated number of acres annually in wheat throughout the United Kingdom being 4,830,000, an increase to the produce of half a quarter per acre would suffice for upwards of two months' consumption of this grain.

X.—*On pure and improved Varieties of Wheat lately introduced into England.*—An Essay, to which the Prize of Twenty Sovereigns was awarded in July, 1839.—By Colonel Le Couteur.

White Downy.

1st. *The mode of procuring the sorts of wheat described.*— One of the best varieties of wheat in general cultivation, from which I have raised large crops, is the "White Downy," or hoary—the "Véloutè" of the French—described in my work on Wheat.

This excellent variety is believed to be the same that is so well described by Boys, in his 'General View of the Agriculture of Kent,' as the "Hoary White," or "Velvet-eared;" said by him to have been much prized by the millers, but then entirely lost.

2nd. *Its culture,—viz., preparation and quantity of the seed; time and method of sowing; relation both as to preceding and following crops, and as to varieties of soil.*—The seed was carefully washed in several waters, till the water appeared clear on stirring the wheat with it: this is intended to draw off any smut, rust, or noxious invisible seed of the fungus tribe, which might be adhering to it, previous to steeping it in brine, made sufficiently strong to float a potato or an egg. In this it was steeped a night, or about twelve hours; then well mixed with powdered lime. This process, it is thought, ensures the destruction of the eggs or larvæ of any invisible insect adhering to the seed.

Time and method of sowing.—The seed thus prepared was sown in drills, on the 29th of January, 1836, 7 inches apart, with an ordinary wheat drilling-machine, at the rate of 2 bushels, or a little more, to the acre. The wheat was carefully hand-hoed in the month of May, which caused it to tiller freely.

Relation both as to preceding and following crops.—The land in which the above wheat was sown had been well dressed with 9 loads of dung to the acre, the previous year, for potatoes, which were twice horse-hoed, and once hand-hoed, to remove any weeds that the horse-hoe might have left. The land remained very clean; and after the potatoes were dug, and well cleared from the soil by 2 ploughings, 36 quarters of sea-weed (or kelp) ashes were spread on the field, or 9 quarters to the acre, at a cost of 2*l.* 5*s.* per acre, and, a month afterwards, ploughed in, about 5 inches in depth, with a view to nourish and warm the young shoots of the wheat, sown 3 inches deep. The ashes have a peculiar tendency to cause the wheat to grain, and render it plump, white, thin-skinned, and farinaceous. They have the additional quality of greatly augmenting the produce of the suc-

ceeding crop of clover. The soil on which the trial was made, being derived from argillaceous schistus, is light and rich, indicating, however, the presence of iron; to counteract the effect of which lime has been applied.

3rd. *Hardihood and power to withstand severe winters.*—This wheat will withstand the most severe weather. The season 1837 to 1838 was a very trying one, both as to wetness and severity of cold, the thermometer having fallen to 18° below freezing; but the crops of this wheat raised by my neighbours were perfectly insensible to it, and of great produce.

4th. *Early maturity and time of severance of crop.*—This wheat is not remarkable for its early maturity, though it cannot be called a tardy variety. On this occasion it was reaped about the 16th of August.

5th. *Tendency to degenerate, and liabilities to disease.*—From my own experience, and from that of the oldest persons I have consulted on the subject, this excellent wheat is not subject to degenerate; and, by bestowing on the portion of it intended for seed the attention recommended in my work, and annually, or even occasionally, varying the manure intended for it, it is possible that it may never degenerate.

The only objection to it is in the huskiness, or velvetty ear, which in damp weather is retentive of moisture; and in snatchy seasons the grain is more apt to sprout than the smooth-chaffed varieties. It is not much affected with dust-brand; and, when pickled and limed as described above, has never been found with smut-balls. It is little liable to shed, even when over-ripe, and will resist very heavy gales without being laid or broken. In the wet and stormy season, which prevailed in the Isle of Man before last harvest, this was the sort which resisted it best. Its height is from 4 to 5 feet, according to the soil.

6th. *Amount of produce in grain, chaff, and straw: and the relative quantities of flour and offal.*—This crop produced 48 imperial bushels to the acre, of a very fine sample. It weighed 62 lbs. the imperial bushel. The straw was firm and white; the weight of it produced was 4557 lbs., and that of the chaff 315 lbs. to the acre.

Quantity of flour and offal.—The quantity of flour obtained from an acre was 2402 lbs. of the finest, 126 lbs. of pollard, and 416 lbs. of bran.

The bread is of a very fine quality, white, and rather of a

moist nature; 18 lbs. of this flour making 25 lbs. of bread. With a view to further the design of the Agricultural Committee, the mode of making this bread is stated, which may enable other persons to make comparative experiments with similar quantities of flour from their own wheats. The flour was placed to rise, or to sponge, overnight, with ½ a pint of yeast and 2 quarts of water. At 9 o'clock the next morning, 4 ounces of fine salt were added, and it imbibed 3 quarts of water, milk-warm, which was well worked up, drawn up (as it were) into strings to expose it to the air as much as possible, in order to render it light; which is preferable to pressing it down with the closed fist, which more or less excludes the air, and tends to render the bread heavy. The dough is then left in tin pans to rise for 20 minutes or ½ an hour, and is usually baked in 2 hours, more or less, according to the size of the loaf. It is weighed when cold the next morning.

It is to be observed that some flour has only imbibed, on the following morning, after being placed to rise overnight, 2 quarts and 1 pint of water; whereas other sorts have imbibed as much as 3 quarts and 1 pint, or a quart more.

Crop.

	£.	s.	d.	£.	s.	d.
45 bushels, at 8*s*. per bushel . . .	18	0	0			
3 ditto Tailings, at 5*s*.	0	15	0			
Straw, 40¾ cwt., at 1*s*. per cwt. . .	2	0	9			
				20	15	9

Charges.

Rent of land per acre	5	12	6			
9 quarters of ashes	2	5	0			
Tithe	0	8	6			
One ploughing for crop	0	8	0			
Half-tillage and dressing on potatoes	2	0	0			
Seed, 8*s*. per bushel	0	16	0			
Sowing	0	2	0			
Bush-harrowing and rolling . . .	0	1	0			
One hoeing	0	5	0			
Reaping	0	8	0			
Cartage, stacking, and threshing .	0	15	0			
Interest on capital	0	10	0			
				13	11	0
Profit . . .				£7	4	9

JERSEY DANTZIC.

1st. *The mode of procuring the sorts of wheat described.*—The seed is described as having been raised from a single ear, origin-

ating from seed procured from Dantzic selected from the finest "High Mixed." It is, however, suspected to be identical with some excellent sorts, called in Sussex, Kent, and some parts of Surrey, the "Chittums," in other parts "Pegglesham;" in Berkshire, "Trump;" in Essex, "Hardcastle;" in some counties, "Old Suffolk;" in Scotland, "Hunter's White;" and assuming several other names.

2nd. *Culture: viz., preparation and quantity of the seed; time and method of sowing, both as to preceding and following crops, and as to varieties of soil.*—The seed was prepared precisely in the same manner as the last described: it was sown on the same day on a contiguous piece of land of the same nature as the last described for the purpose of comparison, therefore prepared and manured in like manner.

3rd. *Hardihood and power to withstand severe winters.*—This wheat is not quite so hardy as the "Hoary;" it is nevertheless considered sufficiently so to succeed throughout the kingdom, excepting the north parts of Scotland. In rich soils it tillers amazingly, and produces a longer straw than the Hoary, nor is it so liable to sprout in a moist climate, from being smooth chaffed: in very severe, moist, and stormy weather, it will be laid sooner than the Hoary.

4th. *Early maturity and time of severance of crops.*—It ripens a week earlier at least than the Hoary, and should be reaped while the grain can be marked by pressure from the thumb-nail, as it is rather liable to shed if over-ripe,—a disadvantage which the Hoary is peculiarly free from, as it is tenacious to the ear.

This was reaped about the 12th of August.

5th. *Tendency to degenerate and liabilities to disease.*—The experience of five years has not found this wheat to degenerate. A sample raised this year, from that procured as above stated, was quite pure and unmixed, it may be said, as only 93 ears of foreign growth were picked from one hundred sheaves, which were carefully examined in order to free the sort from any of stray kinds which might accidentally have got intermixed with it. This is a practice which I now constantly follow with the wheat set apart for seed for the ensuing year.

In a dry season this wheat will afford a beautiful clean, white straw, fit for bonnet-making, or any purpose of thatching: it is firm and tenacious. In wet seasons it is rather subject to

rust, which under such circumstances almost all wheat suffers from.

It is a fact worthy of notice that, in 1837, a field of this wheat, which had been sown with seed carefully washed and steeped in a solution of arsenic,* had not a single smutted ear; but on one headland, for which there was not sufficient seed, a small portion was fetched from the barn, and sown dry; though appearing a beautiful sample, it was infested with smut throughout; this was of course carefully picked out by hand before it ripened fully, and burned.

6th. *Amount of produce in grain, chaff, and straw, and the relative quantities of flour and offal.*—The crop produced 43½ imperial bushels of 63 lbs.; of chaff 430 lbs.; and of straw, as described, 4681 lbs. to the acre. The quantity of flour obtained from an acre was 2161 lbs., of bran 510 lbs., and of pollards 96 lbs.

The bread from this flour is of a dry light nature, very white and good, but objected to by some from its being quite what is termed dry bread at the end of 48 hours. It is, however, of excellent yield, and, according to the millers, exceedingly fine and smooth in the working. It is a valuable wheat: 18 lbs. of the flour, treated as the former variety, imbibed the following morning 3 quarts and 1 pint of warm water, and produced 25¾ lbs. of bread, weighed when quite cold.

Crop.	£.	*s.*	*d.*
40½ bushels at 8*s*. per bushel . . .	16	4	0
3 ditto Tailings, at 5*s*.	0	15	0
Straw, 41¾ cwt., at 1*s*. per cwt. . .	2	1	9
	19	0	9
Charges as in the last	13	11	0
Profit . . .	£5	9	9

Whitington Wheat.

1st. *The mode of procuring it.*—From Mr. Whitington himself, a very fine pure sample. The grain is large, full, and plump, rather of a whitish-red cast, and a little thick-skinned.

* The steeping of seed in a solution of arsenic is a dangerous practice, as, from the poisonous nature of the drug, there is a great hazard of accidents occurring. The steeping in brine, as above described by Colonel Le Couteur, is an effectual prevention of smut, and not accompanied with any danger.—Spencer.

2nd. *Culture; viz., preparation and quantity of seed; time and method of sowing; relation both as to preceding and following crops, and as to varieties of soil.*—The seed was washed, pickled, drained, and limed, as is usual on this farm; then sown in drills 7 inches apart, about 3 bushels to the acre, on the 8th of January, 1838. When the seed is large, it is considered prudent to add half a bushel or more to the acre.

The field had borne potatoes the preceding year, and after two ploughings to free it from any potatoes which might have been left, it was dressed with 2 hogsheads of lime, 6 quarters of lime ashes, and 5 quarters of kelp ashes, at a cost of 2*l*. 5*s*. 6*d*. per acre. This mixture of manures was with a view to afford the wheat a different food from any it might have received, all of them having a tendency to cause the corn to grain, and rather check the overabundant growth of straw. Owing to the cold and frosty season which followed, the wheat was 49 days in coming up; it was hoed in the middle of April, and again in May, which left the land very clean, and the crop continued to look beautiful throughout the season.

It is worthy of remark, that a piece of the wheat was laid along the centre of the field, over which a pipe of liquid manure had been spread from a watering-cart the preceding season on potatoes, just as they were appearing above ground. The crop of potatoes not having absorbed the whole of the nutritive properties of the liquid, the wheat grew taller, coarser, darker, and so abundant in straw, that it afforded less grain, and that too of an inferior sample to the corresponding strips on either side of it. The straw was 7 feet long in many places, and fully 6 feet over the whole field, which consists of a soil derived from argillaceous schistus on a red clay bottom.

3rd. *Hardihood and power to withstand severe winters.*—I consider this to be a very hardy wheat, affording much herbage and straw, very fit for being eaten down by sheep in the spring, when sown early in the fall.

4th. *Early maturity and severance of crop.*—The "Whitington" is rather a late wheat, ripening a week or ten days later than the Jersey Dantzic, before described, though it was in bloom on the same day, on the 2nd of July. It was chopped on the 24th of August.

5th. *Tendency to degenerate, and liabilities to disease.*—From the purity of the seed, and the uniform appearance of the crop, it does not appear likely to degenerate, nor does it seem more liable

to disease than other wheats, but its recent introduction prevents a conclusive opinion being offered on this head. The straw is brittle and many ears break off.

N.B. From the cultivation of another year (1839), I am inclined to think this to be one of the most valuable wheats for poor land: it has not degenerated in the smallest degree.

6th. *Amount of produce in grain, chaff, and straw, and the relative quantities of flour and offal.*—The produce in grain was 33 bushels the acre, a very good sample weighing about 61 lbs. the bushel; the chaff, 483 lbs.; and the straw 7786 lbs. per acre. Here was an amazing produce in straw, which made amends for the deficiency in grain; it is the most productive variety I have met with but one for the straw-yard. The straw is so long that it is unfit for the ordinary purposes of thatching; a short, tenacious, firm straw being generally preferred. The quantity of fine flour obtained from an acre was 1454 lbs., of bran 477 lbs., and 47 lbs. of pollard. The bread from this flour is rather dark, but very well flavoured, and keeps moist some days: 27 lbs. of this flour made into bread, in the mode formerly described, in the same relative proportions of yeast, salt, and water, afforded, when cold 35½ lbs. of excellent bread.

Crop.

	£.	s.	d.
31 bushels, at 8*s.* per bushel . . .	12	8	0
2 ditto Tailings, at 5*s.*	0	10	0
Straw, 69½ cwt., at 1*s.* the cwt. . .	3	9	6
	16	7	6
Charges to deduct as before, with an extra hoeing, and an additional half-bushel of wheat . . .	14	0	0
Profit . . .	£ 2	7	6

Belle-Vue Talavera.

1st. *The mode of procuring it.*—Described in my work on Wheat as having been raised from a single grain. This admirable variety is invaluable, where it is adapted to the soil and climate.

2nd. *Culture; viz., preparation and quantity of the seed, time and method of sowing, relation both as to preceding and following crops, and as to varieties of soil.*—The seed was prepared precisely as before described. The cultivation of the two fields destined

for this wheat and the Whitington had been similar throughout the course, with the view to ascertain the result on the crop of wheat. This was sown on the 3rd of February, 1838, at the rate of nearly 3 bushels to the acre in drills, on land dressed in the same manner as the contiguous field had been for the Whitington; the land in both may be said to be alike, the best description of light, rich, loamy soil, The seed being large, a greater quantity of it was allowed than usual. It is to be noticed that in another field the seed was put in as late as the 21st February, and that it ripened equally well and early.

3rd. *Hardihood and power to withstand severe winters.*—This wheat has succeeded in the North of Scotland, and is sufficiently hardy to withstand the winter in its grassy state, but it is otherwise more valuable as a spring crop: without doubt it may be sown as late as the first week in February, in all the milder parts of England, with a prospect of reaping quite as good an average crop from it as from any other wheat, but with a certainty of obtaining more flour than from most. A celebrated Scotch agriculturist wrote of it on the 12th of September last—" Talavera is nearly ripe, but such has been the untowardness of the season, I do not expect any other wheat to make any return." This testimony is in favour of its early habits and hardihood also. It is what the French have long sought for—both a winter and a spring wheat.

4th. *Early maturity and severance of crop.*—The wheat appeared in 25 days, on the 1st of March; it was in bloom on the 30th of June, and was chopped on the 17th of August, a week sooner than the Whitington, which was sown nearly a month before it.

5th. *Tendency to degenerate and liabilities to disease.*—There is no tendency to degenerate observable in this wheat, as far as the experience of five or six years goes; nor from its early habits is it at all likely to become intermixed by fecundation from other varieties, though sown about the same period, as it will, in such cases, flower a fortnight or three weeks before them. It is not more liable to disease than ordinary white wheats, and affords a very fine, clear white straw: it is indeed one of the Italian bonnet-making varieties. There is, however, one disadvantage in it, which is, that the ear is so heavy that it is apt to break down, though not break off, when swept by a gale about the period of ripening; but it has a countervailing good quality, of ripening the grain equally well though bent down; as is the case with spring wheats, which ripen their seed well though quite laid, which with

winter wheats is doubtful. Another peculiarity is the tenacity of the chaff to the ear, more remaining on it after passing through the threshing-machine than any other variety I am acquainted with.

6th. *Amount of produce in grain, chaff, and straw, and the relative quantities of flour and offal.*—The amount of produce in grain was 52 Imperial bushels to the acre; the grain is so large that it tells in the measure; the sample very beautiful, as a bushel of it, which will be produced at the Oxford Meeting, will show—uniform, clear, and thin-skinned. Hence the weight in grain at 61lbs. the bushel, was 3172lbs., the weight of chaff 282lbs., and of straw 5480lbs. The quantity of flour obtained was 2485lbs., the quantity of pollard 38lbs., and of bran or offal 588lbs. The bread made from this flour is incomparably the best that I have met with; it is light, very white, and preserves its moisture almost as long as bread made from spring wheat. It is, moreover, so sweet and well-flavoured, as to appear to some palates more like cake than ordinary bread. Independently of the large proportion of flour it affords, it makes much of this fine bread; 18lbs. of the flour, having absorbed more water than the last described, gave 25lbs. of bread.

Crop.

	£.	*s.*	*d.*
48 bushels, at 8*s*. per bushel . . .	19	4	0
4 ditto Tailings, at 5*s*.	1	0	0
Straw, 48¾ cwt., at 1*s*. the cwt. . .	2	8	9
	22	12	9
Charges to deduct, as per Whitington .	14	0	0
Profit . . .	£ 8	12	9

The weights of 18lbs. or 27lbs. used for the flour to be baked are intended to be comparative experiments of weights of nines, it being generally understood, especially in baking bread and serving it out to troops, that 9lbs. of common flour will make 11lbs. of bread. All those, however, that I have experimented on afforded more: the two lowest having afforded, from 18lbs. of flour, 22lbs. 9oz., and 23lbs.; the former of my own growth, the latter made from wheat imported from Rostock and Dantzic mixed.

In all the cases detailed, the succeeding crop was not allowed to interfere with the wheat crop; the clovers and artificial grasses having been sown subsequently to the harvest, after one light ploughing.

In some cases I have sown the clovers and grasses after the second hoeing, but always, I am inclined to think, at some expense to the wheat crop; the coronal roots of which may be deprived of a share of their nutriment when the grass seeds begin to draw nourishment from the soil, and the thousands of mouths which they present may deprive the wheat of much pure air, and themselves exhale gases which may be injurious to the plants.

Nothing can be more apparent than the sudden check wheat sometimes receives at the moment the grasses appear to take possession of a portion of the juices of the earth, which probably should be entirely devoted to the nutriment of so valuable a crop as wheat. This is of itself an inquiry well worthy the nicest investigation.

The following sorts I have also grown experimentally, but not having raised them in quantities sufficient to warrant a positive opinion, which probably might only tend to mislead, they are merely named. It is to be observed that a little calculation might have offered all the replies required by the conditions stated in the margins:—

The " Golden Drop" is one of the best red wheats, affording great produce in corn and straw, and a larger quantity of flour than some white wheats.

Hickling's " Prolific Red" is a productive variety, but rather coarse.

Brown's " Ten-rowed Chevalier," or prolific, is well named, where it suits the soil and climate; it has borne a fine crop with me, but it unfortunately has sported much into a pale red sort, owing no doubt to the seed which I obtained from Mr. Brown himself having been accidentally impregnated by a red sort; it is, when pure, a very fine variety.

" Gale's Hampshire" is an enormously productive sort of bearded wheat, which may be hereafter described.

" Essex Red." A very good variety.

" The Duck's Bill" wheat is very productive, but shedding greatly, and not very farinaceous.

J. Le Couteur.

Belle-Vue, Jersey,
December, 1838.

In order to present the particular points of comparison between the four principal varieties forming the subject of this Essay, at one glance, the results are appended in a tabular form.

COMPARATIVE STATEMENT OF THE RESULTS.

	Soil.	Manure.	Quantity of seed per acre.	Time of Sowing.	Harvested.	Produce per Acre.				Produce per Acre in		Produce of Bread from 18 lbs. of Flour.	Net Profit.		
						Grain.	Straw.	Chaff.	Weight of bushel.	Finest Flour.	Flour, &c. (Pollard and Bran.)				
						bush.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	£.	s.	d.
White Downy.	Argillaceous Schist, light and rich	Kelp Ashes, 9 qrs.	2 bushels	Jan. 29.	Aug. 16.	48	4557	315	62	2402	542	25	7	4	9
Jersey Dantzic.	Ditto.	Ditto.	Ditto.	Ditto.	Aug. 12.	43½	4681	430	63	2161	606	25¾	5	9	9
Whitington.	Ditto on a red clay bottom.	2 hhds. of lime, 6 qrs. lime ashes, 5 qrs. kelp ashes.	3 bushels	Jan. 8.	Aug. 24.	33	7786	483	61	1454	524	23⅔	2	7	6
Belle-vue Talavera.	Ditto.	Ditto.	3 bushels	Feb. 3.	Aug. 17.	52	5480	282	61	2485	626	25	8	12	9

N.B. In the estimate of profit in the last column the calculation is not made with relation to the respective values of the wheats, as to their productiveness in flour, which it might be, but according to the ordinary marketable value of good wheat; the straw is valued as intended for manure.

XI.—*On Rural Economy Abroad.*—An Essay to which the Society's Gold Medal and Twenty-five Sovereigns were awarded in July, 1839.—By J. STANLEY CARR, Esq., of Fuschenbach, in the Duchy of Luxemburg.

FEELING it to be the duty of every large landowner, in whatever country, and however humble his talents may be, to respond to your call for information, I shall venture to offer, from time to time, an account of the husbandry of the North of Germany, beginning with my own immediate neighbourhood.

The Mecklenburgs.—These countries, about 100 miles long and 60 broad, are situated between the Baltic on the north, Pomerania on the east, Brandenburg on the south, and Holstein and Luneburg on the west. From north to south there is a ridge of elevated sandy land (the same which may be traced from the Bannat in Hungary to Jutland in Denmark), varying from 10 to 20 miles in breadth, affording miserable crops of corn and worse pasture; but the soil improves on both sides towards the Elbe and the Baltic, where fine districts of rich loams and clays are managed with considerable plodding industry. The size of farms varies from 50 or 60 acres, in the hands of the peasantry, to 300, and even 2000 acres, cultivated by farmers, but more frequently by the proprietor. A comfortable country-house is usually situate about the middle of the estate, flanked by rows of very large buildings, often 200 feet long, by 60 broad:—1st, a stable, &c.; 2nd, cow-house and dairy, the number of cows varying with the extent of the farm, but often amounting to 300 or 400, exclusive of young cattle and oxen; 3rd, a sheep house, to contain from 500 to 5000 sheep; and lastly, barns, for putting the whole of the crops under cover. The threshing-floor extends through the whole length of the house, and is large enough to admit a full 4-horse waggon of corn, and to give shelter to a dozen at a time if necessary, which is often of much consequence in catching seasons; and although these large buildings are a serious expence at first, they require little repair, and facilitate harvesting greatly.

Mecklenburg, situated in the same latitude as Yorkshire, with a climate warmer and dryer in summer, and colder in winter, is prosperous, although the rotations are defective, and the agricultural implements of remote antiquity. The instrument which serves as a substitute for a plough is called a haken, and the same as the Romans used, according to Loudon (page 112, figure 13 *b*). The harrows are often with wooden teeth, and in using them the driver lunges 5 horses with a harrow each, in a circle of about 10 yards in diameter, half the round at a quick walk and the rest at a trot, and as he steps backwards slowly a few inches at a time,

the work advances. The system of cultivation is to tear up the pasture intended for fallow with the hacken, in autumn, leaving a large rough clod exposed to the winter. As soon as frost and snow have made all hard and even, 4-horse waggons are employed to carry out the long fresh dung from the yards, which is spread at once over the land, where it lies exposed till the dry weather of spring admits of its being worked under with the same implement. After some weeks a favourable moment is taken for harrowing, with a heavy brake, and subsequently with the small wooden harrows, which work the couch grass to the surface. Two furrows are afterwards given, and where the land has a sufficient proportion of clay, rape-seed is sown broadcast in the end of July or beginning of August; this crop is greatly benefited the following spring by dusting gypsum over it, about 100 lbs. to the English acre. In July the seed is ripe, and as the weather is generally fine, is trodden out by horses, very expeditiously, on large canvass sheets in the field. The oil of this seed, when purified, is without smell, gives a brilliant clear-burning flame, and is universally used all over Germany, in the saloon and the cottage. The value of the crop is very precarious, because it is subject to so many contingencies; the turnip-fly, slug, and caterpillar, make war upon it when young, and when in flower a small beetle (Haltica nemorum) often eats away the blossom-bud, or lays its minute larvæ in the petals, ultimately furnishing every pod with a maggot, which either eats the seed away, or, forcing the pod open when nearly ripe, causes it to fall out. When spared all these calamities it is, however, a very remunerating crop, worth from 10*l.* to 20*l.* an acre, especially if there is a foreign demand. The straw is generally burned, and the ashes scattered over the field; it is sometimes sold to the soapboilers who value it highly. Two furrows are then given for wheat, sown broadcast in September.

The usual rotation, 10 years ago, would then have been to sow barley followed by oats, and if the land could bear it, oats again, laid down with a little red clover and grass seeds, for 3 or 4 years. But agricultural knowledge has much increased by the example of individuals and well-organised associations. The improved rotations are now generally of 10 years, viz.:—1st year, fallow, well dunged; 2nd, rape; 3rd, wheat; 4th, barley; 5th, (light dunging) peas; 6th, rye; 7th, oats, sown down with rye or timothy-grass and red clover, which, as well as the peas, is gypsumed with great effect before the dew has left the plant of a May morning. The clover is mown twice for hay, and left two years longer for pasture.

The means of obtaining a sufficient quantity of manure for

such a scourging course, where neither composts, bones, nor any other substitutes are resorted to, are deserving of notice. In the first place the beginning of all improvements in these countries is to give a dressing of *marl* (containing on an average 60 per cent. carbonate of lime), at the rate of 164 cubic feet per acre; by this means land not worth cultivation previously yields excellent crops for 8 or 10 years, and if the straw produced during that time is carefully converted into manure, the productiveness does not materially decrease. Should that, however, be the case, the deposits of ponds, and even plots of peat moss, which not unfrequently occur, are carried upon the fallows in winter, where these substances, when broken down by the frost, prove a valuable alterative to the texture of the soil, especially where the pulse, rape, and clover crops are gypsumed.

The maintenance of the various stock by which the manure is produced (and which is debarred from pasturage during six months of the year by climate) comes next to be considered. There has long been a useful breed of horses in these duchies, suited to sandy roads, where a 5 mile-an-hour pace was all that was compatible with the safety of the carriages; but now that good M'Adamized roads are becoming more frequent, they have not lungs nor action enough, and the breed is being supplanted by a cross from English thoroughbred and other stallions, to which the magnificent studs of the late and present Counts Plessen, of Ivenack; the Counts Bassiwitz and Hahn; and Barons de Maltzahn and Biel have chiefly contributed. The farm-horse is a long-legged, small-bodied, big-headed, shapeless animal, bred in Holstein or the Danish islands, his price from 15*l.* to 20*l.*, and 2 tons is a load for 4 of them, in a waggon, over country roads.*

The *haken* is generally worked by 2 oxen, which, with the cows, are tended during the summer upon the pastures, and from the time the corn fields are cleared, upon the stubble and young clovers till November, when they are taken into the house, and fed with hay and straw, during the winter. A great desideratum in these countries where turnip culture is unknown, is a considerable proportion of natural meadows, along the banks of rivers, or reclaimed from peat bogs. The warm summers force the indi-

* English stallions have been long employed in Mecklenburg for the improvement of saddle-horses. I myself purchased a pair from the late Count Plessen full 30 years ago: they were got by one of our celebrated racers, and bred upon his estate. He then had 120 brood-mares, and his stock commanded rather high prices. The farm-cattle of the neighbourhood were then, however, not worth more than half the prices above mentioned.—F. Burke.

genous swamp plants into luxuriance, and two crops of coarse hay are generally obtained. It cannot be expected that dairy cows, even in cases where they get the addition of some sheaf oats for some weeks in spring, can yield a great quantity of milk after being kept for six months entirely on dry food, but they are necessary, even if not very remunerative, to convert the straw and hay into manure, and are generally let to a dairy-man at about 2*l.* 10*s.* per head.

The Saxon or Merino Sheep, however, is the animal which best remunerates the Mecklenburger, and forms the especial object of his care and attention. They were brought to these countries from Saxony, about the year 1811, and are now universal. The greatest pains are taken to produce fleeces as nearly equal as possible over the whole flock. The nature of this sort of sheep is so little known in England, although an object of such vital importance to the British Australian Colonies, that I venture to hope a description of it may be acceptable.

The Merino is a long-legged, narrow-bodied, ugly animal with a fleece varying in weight, in proportion to its coarseness, (although fine wool is specifically heavier than coarse) from 2 to 3lbs. The staple is very close and thick growing, greasy or oily to the feel, elastic and soft, very tenacious, and formed differently from any other wools, with a number of regular, minute bends, or curls, in each hair. There are always different sorts of wool upon the same sheep, and that animal is of course the most esteemed which produces the highest qualities in the greatest proportion. Breeding successfully with this view is a most difficult science, requiring years of pains-taking intelligence to attain. I was present at the exhibition of 22 rams at the cattle show of Güstrow in Mecklenburg, in May 1837. The specimens, to an inexperienced eye, appeared much alike; they were carefully washed and shorn, the fleeces numbered and sent to the most eminent wool-staplers at Leipsic, where they were submitted to accurate assortment and valuation. I annex a translation of the published document, by which it will be seen how enormous the difference in value, between one flock and another, of nominally the same animal, may be. The Merino is supposed to be indigenous to Spain, and known to have been first introduced into Germany in 1765 by the then Elector of Saxony. Shortly after (about 1775) another small flock was brought to Austria, and subsequently in 1786, and 1802, to the imperial domains of Holditch in Hungary, and Mannersdorf in Austria. From these small beginnings has this valuable animal been spread over these immense countries. But there are two distinct breeds, which differ materially in shape, and the quality of their wool.

1st.—The Infantado, or Negretti, distinguishable by shorter

legs, and a stouter make; the head and neck generally short, and broad, the nose short and turned up, and the body round like a barrel. The wool is often matted upon the neck, back, and thighs, and grows upon the head to the eyes, and upon the legs to the very feet. The grease in its fleece is almost pitchy, and as the dust becomes incorporated with it, the washing is a matter of difficulty, and risk; the greatest care is at all times necessary in this operation. A warm mild day, without harsh or drying wind, is indispensable, and care must be taken never to rub the fleece with the hand. A marl-pit with a depth of from 8 to 10 feet of clear water is a favourite washing-place, and is thought to become better every year. The sheep are thrown in from a stage in the evening, and made to swim the whole length of the pond, (20 to 30 yards) between rails, with boards on one side, from which women or boys assist them through their bath, by placing wooden rakes or crooks under their chins, and so passing them onwards. When the water has dripped from the fleeces for an hour or two, the sheep are put into a house for the night, as close together as possible, in order to cause the greater evaporation, and the next day they are swum three or four times through the same pond, the last time the head being rubbed a little, and they are kept in the house (well supplied with clean straw) on dry food, for three or four days, until the wool, by sweating as it is termed, has recovered its characteristic softness. The fleece of this species is generally thick, closely grown, and abundant. Ewes may average 2¼ and even 3¼ lbs. by careful feeding (which however must never approach to feeding to be fat, else the wool becomes wiry and hard), and rams and wedders may bring 4 lbs, and even 6 lbs. This is the animal which came to Austria from Spain.

The other distinct breed is the Saxon importation, and is called Escurial. Their shape differs markedly from the Infantados, longer legged, with a long spare neck and head, with very little wool on the latter: a finer, shorter, and softer character in its fleece, but deficient in quantity. 1½ to 2 lbs. is frequently the amount from ewes, and 2 to 3 lbs. from rams and wedders. On being presented to the Elector of Saxony in 1765, they received the appellation of Electorals. A great deal of trouble has been taken to combine the advantages of both breeds by crossing, but with doubtful advantages; and although the mixed breed has been found suitable for crossing with sheep not thorough-bred (called Mestizen), yet experience has shown, that to breed with advantage, all the rams, be the ewes what they may, should be either thorough-bred Infantados or Escurial, and that the same strain of blood should be persevered in; I know an instance where a large and valuable flock has been for years retrograding, in consequence of

one unsuitable ram having been introduced 12 or 14 years ago. Good rams are of course becoming every year more attainable, but there are examples of breeders in Saxony who still obtain, for distinguished rams, as much as 100, 200, and even 300 Louisdors*.

I am aware that these sheep have frequently been brought to Britain† from Spain, but there never was labour more lost, as they cannot thrive in a damp climate; besides, it is quite necessary that they should have a wide range of dry and hilly pasture, of short and not over-nutritious herbage. If allowed to feed on swampy or marshy ground, even once or twice in autumn, they are sure to die of liver-complaint in the following spring. If they are permitted to eat wet grass, or exposed frequently to rain, they disappear by hundreds with consumption. In these countries it is found that the higher bred the sheep is, especially the Escurial, the more tender. They are always housed at night, even in summer, except in the very finest weather, when they are sometimes folded in the distant fallows; but never taken to pasture till the dew is off the grass. In winter they are kept within doors altogether, and are fed with a small quantity of sound hay, and every variety of straw which has not suffered from wet, and which is varied at each feed: they pick it over carefully, eating the finer parts, and any corn that may have been left by the threshers. Abundance of good water to drink, and rock-salt in their cribs, are indispensables.

In letting a large farm the usual calculation is, that the clear returns from the sheep and dairy should pay the rent, always including taxes; and that the corn sold should cover the labour and other expenses of the farm, support the farmer's family, and leave a surplus, more or less, in proportion to the industry and skill employed.

The farm-servants consist of active young men, lodged and fed in the house, and paid from 5*l.* to 6*l.* wages per annum (including perquisites, called sack-money, for all grain sold), who take charge of four horses and one waggon each, plough, &c. &c. These are assisted by married labourers, who have a free house and firing, a cow kept, about one English rood of garden (which is well manured every second year), and twice as much potatoe-land; which, together, supply them with abundance of fruit (fresh and dried), vegetables, and potatoes, for their families; and

* The Louisdor is worth rather more than 19 shillings.

† The disuse of the pure Merino in this country may rather be ascribed to the circumstance that our breeders look to the mutton for their profit, and the Germans to the wool.—F. Burke.

serve also to bring up and fatten a pig or two annually, which forms the chief part of their animal food. Their wives work at all times when required, but especially in harvest, when they are employed in binding the corn, which the men mow. The wages may be averaged for men, from the 1st of May to the 1st of November, at 10*d*., and in winter 8*d*. per day; the women always 2*d*. less. The men earn much more by hand-threshing, in which they are employed from the time the harvest is housed till May or June, and for which they get 1 sack in every 14, 16, or 18, according to their agreement, which is influenced by the abundance or scarcity of hands in the neighbourhood, and the probable returns from good land or bad. They frequently earn 16*d*. a-day by their work, when prices are good; and even at the lowest, they have bread for their families, and to spare. Poverty is rare, seldom occurring except from misfortune or sickness; and in such cases they are supported by the lord of the soil, so that wandering beggars are unknown. The rent of land has increased within the last 20 years by 50 per cent., and may now be averaged at about 18*s*. sterling per acre for a mixed farm of wheat and barley soils. Petty crime is as little frequent as in any other country that could be named, while open violence is almost unheard of.

ASSORTMENT and VALUATION of 22 WOOL FLEECES, sent to us by the Count de Osten Sacken, President of the Mecklenburg Patriotic Society.

(Signed) T. B. HEYER.
G. VOSS.
F. HARTMANN.
E. FABER.

Leipzig, 14*th Nov.* 1837.

FLEECE No. 6.

Assortment.	Price, in Leipzig, of 1836. Per cwt. of 110 lbs., reckoned in Prussian Dollars.	Value and Weight of the different parts of the Fleece. Half Oz.	Dollars.	Groschen.	Pence.
	Doll.				
Super Electoral	180	57	2	21	$11\frac{3}{8}$
Electoral pieces .	120	$7\frac{3}{4}$	..	6	4
Prima ditto . .	80	1	..	..	$6\frac{1}{2}$
Secunda ditto .	55	$\frac{1}{4}$	..	..	$1\frac{1}{8}$
Fine yellow . .	80	1	..	..	$6\frac{1}{4}$
Points . . .	45	$\frac{1}{2}$	..	..	$1\frac{3}{4}$
Refuse . . .	..	$\frac{1}{8}$	..	..	..
Wt. and val. of whole fleece		$67\frac{5}{8}$	3	5	7

FLEECE No. 15.

Assortment.	Price, in Leipzig, of 1836. Per cwt. of 110 lbs. reckoned in Prussian Dollars.	Value and Weight of the different parts of the Fleece. Half Oz.	Dollars.	Groschen.	Pence.
	Doll.				
First Prima . .	110	$49\frac{1}{4}$	1	12	$11\frac{1}{4}$
Second ditto . .	80	14	..	7	$7\frac{5}{8}$
First Prima piece	90	2	..	1	$2\frac{5}{8}$
Second ditto . .	70	18	..	8	7
Secunda . . .	55	4	..	1	6
Tertia . . .	45	$1\frac{1}{2}$	..	..	$5\frac{1}{2}$
Fine yellow . .	70	2	..	..	$11\frac{3}{8}$
Food	60	$1\frac{1}{2}$	..	..	$7\frac{3}{8}$
Points . . .	35	$1\frac{1}{2}$	..	..	$4\frac{1}{4}$
Matted wool . .	..	1	..	..	..
Refuse . . .	..	$\frac{1}{2}$	..	..	..
Wt. and val. of whole fleece		$95\frac{1}{4}$	2	10	3

FLEECE No. 3.

Super Electoral .	170	$57\frac{1}{2}$	2	14	$8\frac{5}{8}$
Electoral pieces .	110	$11\frac{1}{2}$	..	8	$7\frac{1}{2}$
Prima ditto . .	80	$3\frac{1}{4}$	..	1	$9\frac{1}{4}$
Secunda ditto .	55	$\frac{1}{4}$	..	..	$1\frac{1}{8}$
Fine yellow . .	80	$4\frac{3}{4}$	..	2	7
Points	45	$\frac{1}{2}$	..	..	$1\frac{3}{4}$
Matted wool . .	..	$1\frac{1}{2}$	..	..	..
Refuse	..	$\frac{1}{16}$	..	..	..
Wt. and val. of whole fleece		$79\frac{5}{16}$	3	3	$11\frac{1}{4}$

FLEECE No. 2.

First Prima . .	110	$51\frac{1}{2}$	1	14	$7\frac{1}{2}$
Second ditto . .	80	$7\frac{3}{4}$	..	4	$11\frac{1}{8}$
First Prima piece	90	$5\frac{1}{2}$	..	3	$4\frac{1}{2}$
Second ditto . .	70	$12\frac{1}{2}$	..	5	$11\frac{1}{2}$
Secunda . . .	55	2	..	..	9
Tertia	45	$\frac{1}{2}$	..	..	$1\frac{3}{4}$
Fine yellow . .	70	1	..	..	$5\frac{5}{8}$
Points	35	$1\frac{1}{4}$	..	..	$3\frac{1}{2}$
Matted wool . .	..	$\frac{1}{4}$	..	..	..
Refuse	..	$\frac{1}{4}$	..	..	..
Wt. and val. of whole fleece		$82\frac{1}{2}$	2	6	$6\frac{1}{2}$

Note.—A Prussian dollar is as nearly as possible 3 shillings sterling; each dollar has 30 groschen, and each groschen has 12 pence.

FLEECE No. 10.

Assortment.	Price, in Leipzig, of 1836. Per cwt. of 110 lbs., reckoned in Prussian Dollars.	Value and Weight of the different parts of the Fleece. Half Oz.	Dollars.	Groschen.	Pence.
	Doll.				
Super Electoral .	160	57¼	2	14	5⅜
Electoral pieces .	110	12	..	9	..
Prima ditto . .	80	5	.	2	8⅝
Second ditto . .	55	1	.	..	4½
Fine yellow . .	80	3	.	1	7⅛
*Food	70	1	.	..	5⅝
Points . . .	45	1	.	..	3¾
Matted wool . .	..	1⅛	.	..	..
Refuse . . .	..	⅜	..	..	..
Wt. and val. of whole fleece		81¾	3	4	11½

FLEECE No. 5.

Assortment.	Price, in Leipzig, of 1836. Per cwt. of 110 lbs., reckoned in Prussian Dollars.	Value and Weight of the different parts of the Fleece. Half Oz.	Dollars.	Groschen.	Pence.
	Doll.				
First Prima . .	110	37	1	3	9
Second ditto . .	80	16	..	8	8⅝
First Prima piece	90	1	..	..	7⅜
Second ditto . .	70	19	..	9	¾
Secunda . . .	55	1¼	..	..	5⅝
Tertia . . .	45	½	..	..	1¾
Fine yellow . .	70	3½	..	1	8
Food	60	3½	..	1	5⅛
Points . . .	35	2	..	..	6
Matted wool . .	..	2	..	..	..
Refuse . . .	..	½	..	..	..
Wt. and val. of whole fleece		86¼	2	2	4¼

FLEECE No. 18.

Assortment.	Price per cwt. (Doll.)	Half Oz.	Dollars.	Groschen.	Pence.
First Prima . .	100	63	1	18	10¾
Second ditto . .	80	25½	..	13	10⅞
First Prima piece	90	2	..	1	2⅝
Second ditto . .	70	32	..	15	3¼
Secunda . . .	55	3	..	1	1½
Tertia . . .	45	½	..	..	1¾
Fine yellow . .	70	2	..	..	11⅜
Food	60	1	..	..	4⅞
Points . . .	35	1½	..	..	4¼
Matted wool . .	..	2	..	..	..
Refuse . . .	..	⅛	..	..	..
Wt. and val. of whole fleece		132⅝	3	4	3¼

FLEECE No. 4.

Assortment.	Price per cwt. (Doll.)	Half Oz.	Dollars.	Groschen.	Pence.
Prima . . .	95	47½	1	6	9¼
Secunda . . .	80	21	..	11	5⅜
First Prima piece	90	7	..	..	7¼
Second ditto . .	70	15	..	7	1⅞
Secunda piece .	50	7¼	..	2	5⅝
Tertia ditto . .	40	1½	..	..	4⅞
Food	55	5½	..	2	⅜
Fine yellow . .	65	1	..	..	5¼
Points . . .	30	1	..	..	2⅜
Matted wool .	..	½	..	..	..
Refuse . . .	..	¼	..	..	..
Wt. and val. of whole fleece		101½	2	7	6⅛

FLEECE No. 11.

Assortment.	Price per cwt. (Doll.)	Half Oz.	Dollars.	Groschen.	Pence.
First Prima . .	100	55½	1	13	10
Second ditto . .	80	8	..	4	4¼
First Prima piece	90	1½	..	..	11
Second ditto .	70	22	..	10	6
Secunda . . .	55	2	..	..	9
Tertia . . .	45	½	..	..	1¾
Fine yellow . .	70	11	..	5	3
Points . . .	35	2½	..	..	7⅜
Food	60	½	..	..	2⅜
Matted wool . .	..	3¾	..	..	..
Refuse . . .	..	¼	..	..	..
Wt. and val. of whole fleece		107½	2	12	6¾

FLEECE No. 19.

Assortment.	Price per cwt. (Doll.)	Half Oz.	Dollars.	Groschen.	Pence.
Prima . . .	95	45½	1	5	5⅝
Secunda . . .	80	22	..	12	..
First Prima piece	90	5	..	3	¾
Second ditto . .	70	15½	..	7	4¾
Fine yellow . .	65	2	..	..	10⅝
Points . . .	30	½	..	..	1⅛
Matted wool . .	..	⅝	..	..	..
Refuse . . .	..	¼	..	..	..
Wt. and val. of whole fleece		91⅜	2	4	10⅞

* The technical name for wool destroyed in careless feeding by hay-seeds and dust falling upon the neck.

FLEECE No. 13.

Assortment.	Price, in Leipzig, of 1836. Per cwt., of 110 lbs., reckoned in Prussian Dollars.	Value and Weight of the different parts of the Fleece. Half Oz.	Dollars.	Groschen.	Pence.
	Doll.				
First Prima . .	100	74	2	2	$5\frac{3}{8}$
Second ditto . .	80	12	..	6	$6\frac{1}{2}$
First Prima piece	90	$1\frac{1}{4}$	..	..	$9\frac{1}{8}$
Second ditto . .	70	24	..	11	$5\frac{3}{8}$
Secunda piece .	55	$1\frac{3}{4}$	..	..	$7\frac{7}{8}$
Fine Yellow . .	70	7	..	3	4
Points . . .	35	2	..	..	$5\frac{5}{8}$
Matted Wool .	..	$1\frac{1}{2}$	..	..	..
Refuse . . .	..	$\frac{1}{2}$	..	..	..
Wt. and val. of whole fleece		124	3	4	$7\frac{7}{8}$

FLEECE No. 19.

Assortment.	Price, in Liepzig, of 1836. Per cwt., of 110 lbs., reckoned in Prussian Dollars.	Value and Weight of the different parts of the Fleece. Half Oz.	Dollars.	Groschen.	Pence.
	Doll.				
Prima	95	$82\frac{1}{2}$	2	5	$5\frac{1}{4}$
Secunda . . .	80	9	..	4	$10\frac{7}{8}$
Prima piece . .	68	$3\frac{1}{2}$	..	1	$7\frac{3}{8}$
Secunda ditto .	53	$30\frac{1}{2}$	..	11	$\frac{1}{4}$
Tertia ditto . .	40	1	..	..	$3\frac{1}{4}$
Yellow . . .	65	$4\frac{1}{2}$	..	1	$11\frac{7}{8}$
Points	30	$3\frac{1}{2}$	..	..	$8\frac{1}{2}$
Matted Wool .	..	$\frac{1}{2}$	..	..	..
Wt. and val. of whole fleece		135	3	1	$11\frac{3}{8}$

FLEECE No. 20.

A sort of Prima	95	$70\frac{1}{4}$	1	21	6
Do. Secunda .	80	13	..	7	1
Prima pieces .	68	17	..	7	$10\frac{1}{2}$
Secunda, do. .	53	$5\frac{1}{2}$	..	1	$11\frac{3}{4}$
Tertia . . .	40	$1\frac{1}{2}$	..	..	$4\frac{7}{8}$
Yellow . . .	65	3	..	1	$3\frac{7}{8}$
Points . . .	30	$3\frac{1}{4}$	..	..	$7\frac{7}{8}$
Matted Wool .	..	2	..	..	..
Refuse . . .	..	$\frac{1}{4}$	..	..	..
Wt. and val. of whole fleece		$115\frac{3}{4}$	2	16	$9\frac{7}{8}$

FLEECE No. 9.

A sort of Secunda	80	61	1	9	$3\frac{1}{4}$
Ditto Tertia .	70	8	..	3	$9\frac{3}{4}$
Secunda piece .	50	$9\frac{1}{2}$	..	3	$4\frac{1}{2}$
Tertia ditto . .	45	$28\frac{1}{2}$	..	8	$8\frac{7}{8}$
Quarta ditto . .	40	6	..	1	$7\frac{5}{8}$
Yellow . . .	50	2	..	..	$8\frac{1}{4}$
Food	45	1	..	..	$3\frac{5}{8}$
Points	30	$4\frac{1}{2}$	..	..	11
Matted Wool .	..	$5\frac{3}{4}$	..	..	..
Refuse . . .	..	$\frac{1}{2}$	..	..	..
Wt. and val. of whole fleece		$126\frac{3}{4}$	2	4	$8\frac{3}{4}$

FLEECE No. 1.

A sort of Secunda	85	$40\frac{1}{2}$	..	23	$5\frac{5}{8}$
Ditto Tertia .	75	38	..	19	$5\frac{1}{8}$
Secunda piece .	55	$20\frac{1}{2}$	..	7	$8\frac{1}{4}$
Tertia ditto . .	45	$19\frac{1}{2}$	..	5	$11\frac{3}{4}$
Yellow . . .	55	$\frac{1}{2}$	..	..	$2\frac{1}{4}$
Points . . .	35	11	..	2	$7\frac{1}{4}$
Food . . .	48	$3\frac{1}{4}$	..	1	$\frac{3}{4}$
Matted Wool .	..	$12\frac{1}{2}$	..	..	..
Refuse . . .	..	$\frac{1}{4}$	..	..	..
Wt. and val. of whole fleece		146	2	12	5

FLEECE No. 17.

A sort of Secunda	85	$38\frac{1}{2}$	..	22	$3\frac{5}{8}$
Ditto Tertia .	75	7	..	3	$6\frac{7}{8}$
Secunda piece .	55	30	..	11	3
Tertia ditto . .	45	12	..	3	$7\frac{1}{4}$
Quarta ditto . .	40	$1\frac{1}{2}$	..	..	$4\frac{7}{8}$
Yellow . . .	55	$3\frac{1}{4}$	..	1	$\frac{7}{8}$
Food . . .	48	3	..	..	$11\frac{5}{8}$
Points . . .	30	$1\frac{1}{2}$	..	..	$3\frac{5}{8}$
Matted Wool .	..	$1\frac{1}{8}$	..	..	..
Refuse . . .	..	$\frac{1}{2}$	..	..	..
Wt. and val. of whole fleece		$98\frac{3}{8}$	1	19	$5\frac{3}{4}$

FLEECE No. 8

Assortment.	Price in, Leipzig, of 1836. Per cwt., of 110 lbs., reckoned in Prussian Dollars.	Value and Weight of the different parts of the Fleece. Half Oz.	Dollars.	Groschen.	Pence.
	Doll.				
A sort of Secunda	85	39	..	22	$7\frac{1}{8}$
Ditto Tertia .	75	28	..	14	$3\frac{3}{4}$
Secunda piece .	55	22	..	8	3
Tertia ditto . .	45	19	..	5	$9\frac{7}{8}$
Food	48	$4\frac{1}{2}$	..	1	$5\frac{5}{8}$
Yellow . . .	55	$4\frac{1}{2}$	..	1	$7\frac{1}{8}$
Points . . .	35	11	..	2	$7\frac{1}{2}$
Matted Wool .	..	$\frac{1}{2}$	..	..	..
Refuse . . .	..	$\frac{3}{8}$	..	..	..
Wt. and val. of whole fleece		$128\frac{5}{8}$	2	8	8

FLEECE No. 7.

Assortment.	Price, in Leipzig, of 1836. Per cwt. of 110 lbs. reckoned in Prussian Dollars.	Value and Weight of the different parts of the Fleece. Half Oz.	Dollars.	Groschen.	Pence.
	Doll.				
A sort of Secunda	80	46	1	1	1
Ditto Tertia .	65	23	..	10	$2\frac{1}{4}$
Secunda piece .	55	6	..	2	3
Tertia ditto . .	45	$28\frac{1}{2}$	..	8	$8\frac{7}{8}$
Quarta ditto . .	40	$18\frac{1}{2}$	..	5	$\frac{1}{2}$
Quinta ditto . .	30	5	..	1	$\frac{1}{4}$
Food	48	$5\frac{1}{4}$	..	1	$8\frac{5}{8}$
Yellow . . .	55	$2\frac{1}{2}$	..	..	$11\frac{1}{4}$
Points . . .	30	4	..	..	$9\frac{3}{4}$
Matted Wool .	..	$2\frac{3}{4}$	..	..	..
Refuse . . .	..	$\frac{1}{2}$	..	..	..
Wt. and val. of whole fleece		142	2	7	$9\frac{1}{2}$

FLEECE No. 14.

Assortment.	Price per cwt. (Doll.)	Half Oz.	Dollars.	Groschen.	Pence.
A sort of Secunda	80	85	1	22	$4\frac{1}{4}$
Ditto Tertia .	65	26	..	11	$6\frac{1}{4}$
Secunda piece .	55	21	..	7	$10\frac{3}{8}$
Tertia ditto . .	45	14	..	4	$3\frac{1}{2}$
Yellow . . .	55	$\frac{1}{4}$	..	..	$1\frac{1}{8}$
Food . . .	48	$\frac{1}{4}$	..	..	$\frac{7}{8}$
Points . . .	30	$6\frac{1}{2}$	..	1	$3\frac{7}{8}$
Matted Wool .	..	$2\frac{1}{2}$	..	..	..
Refuse . . .	..	$\frac{1}{4}$	..	..	..
Wt. and val. of whole fleece		$155\frac{3}{4}$	2	23	$6\frac{1}{4}$

FLEECE No. 23.

Assortment.	Price per cwt. (Doll.)	Half Oz.	Dollars.	Groschen.	Pence.
A sort of Secunda	80	$15\frac{1}{2}$	..	8	$5\frac{3}{8}$
Ditto Tertia .	65	$45\frac{1}{4}$	..	20	$\frac{5}{8}$
Secunda piece .	55	$44\frac{1}{4}$	..	16	$7\frac{1}{8}$
Tertia ditto . .	45	33	..	10	$1\frac{1}{2}$
Food	45	2	..	..	$7\frac{1}{4}$
Points . . .	30	$4\frac{1}{4}$	..	..	$10\frac{3}{8}$
Matted Wool .	..	$\frac{1}{4}$	..	..	..
Refuse . . .	..	$\frac{1}{2}$	..	..	..
Wt. and val. of whole fleece		$145\frac{1}{2}$	2	8	$8\frac{1}{4}$

FLEECE No. 22.

Assortment.	Price per cwt. (Doll.)	Half Oz.	Dollars.	Groschen.	Pence.
A sort of Secunda	80	$20\frac{1}{2}$	..	11	$2\frac{1}{8}$
Ditto Tertia .	65	50	..	22	$1\frac{7}{8}$
Secunda piece .	55	$2\frac{1}{4}$	..	..	$10\frac{1}{8}$
Tertia ditto . .	45	$42\frac{1}{2}$	..	16	$5\frac{3}{8}$
Quarta ditto . .	40	$10\frac{1}{2}$	..	2	$10\frac{1}{4}$
Yellow . . .	55	2	..	..	9
Food	45	$8\frac{3}{4}$	..	2	$8\frac{1}{8}$
Points . . .	30	7	..	1	$5\frac{1}{8}$
Matted Wool .	..	$1\frac{1}{4}$	..	..	..
Refuse . . .	..	$\frac{1}{2}$	..	..	..
Wt. and val. of whole fleece		$145\frac{1}{4}$	2	10	4

FLEECE No. 21.

Assortment.	Price per cwt. (Doll.)	Half Oz.	Dollars.	Groschen.	Pence.
A sort of Tertia .	60	12	..	4	$10\frac{7}{8}$
Ditto Quarta .	81	70	..	22	$10\frac{7}{8}$
Tertia pieces . .	44	$26\frac{1}{2}$	..	7	$11\frac{3}{8}$
Quarta ditto . .	40	40	..	10	$10\frac{7}{8}$
Yellow . . .	40	$\frac{1}{2}$	..	..	$1\frac{5}{8}$
Points . . .	25	$6\frac{1}{2}$	..	1	$1\frac{1}{4}$
Food	33	$5\frac{1}{2}$	..	1	$2\frac{3}{4}$
Matted wool . .	..	$\frac{1}{2}$	..	..	..
Refuse . . .	..	$\frac{1}{2}$	..	..	..
Wt. and val. of whole fleece		162	2	1	$1\frac{5}{8}$

XII.—*An Essay on making Compost Heaps from Liquids and other Substances; written on the evidence of many years' experience.*—To which the Prize of Ten Sovereigns was awarded in July, 1839.—By JAMES DIXON, Esq. Secretary to the Manchester Agricultural Society.

THE force and power of an agriculturist to produce good crops mainly depends on the manures he can command; and how to derive the greatest possible benefits from his immediate resources is one of the most useful subjects that can engage his attention. The English Agricultural Society having offered a premium for the best mode of making compost heaps, I venture to forward the Committee my ideas on this most important branch of rural management; and in doing this I shall state the course I have pursued in this particular for many years, and in which every additional experience inclines me not to make any systematic alteration.

My farm is a strong retentive soil, on a substratum of ferruginous clay; and being many times disappointed in what I considered reasonable anticipations of good crops, I determined on a new system of manuring. Though quite satisfied of the expence which would necessarily be incurred by my plan, I still determined on its adoption. At the onset I effectually drained a considerable part of my farm. My next object was how to improve its texture at the least cost—(perhaps I may be allowed to state that my holding has always been at rack-rent); for this purpose we carted great quantities of fine sawdust and peat-earth or bog; we had so far to go for the latter, that two horses would fetch little more than three tons in one day—one horse would fetch three cart-loads of sawdust in the same time. Having brought great quantities of both peat and sawdust into my farm-yard, I laid out for the bottom of a compost heap a space of considerable dimensions, and about three feet in depth: three-fourths of this bottom was peat, the rest sawdust; on this we conveyed *daily* the dung from the cattle-sheds; the urine also is conducted through channels to wells for its reception,—one on each side of the compost heap;—common water is entirely prevented from mixing with it. Every second day the urine so collected is thrown over the whole mass with a scoop, and at the same time we regulate the accumulated dung. This being continued for a week, another layer, nine inches or a foot thick, of peat and sawdust (and frequently peat without sawdust) is wheeled on the accumulated heap. These matters are continuously added to each other during winter, and in addition once in every week never less than 25 cwt., more frequently 50 cwt., of night-soil and urine; the latter are always laid next above the peat or bog-earth, as we think

it accelerates their decomposition. It is perhaps proper here to state that the peat is dug and exposed to the alternations of the weather for several months before it is brought to the heap for admixture; by this it loses much of its moisture. In some cases, peat contains acid or astringent matters, which are injurious to useful vegetation. On this I have not tried any decided experiment, but am led to the supposition by frequently seeing stones, some in a partial state of decomposition, others wholly decomposed in bogs, and at the depth of several feet from the surface. Some years' experience has convinced me of the impropriety of using recently dug peat; proceeding in the manner I recommend, it is superior and more convenient on every account —very much lighter to cart to the farm-yard or any other situation where it is wanted; and so convinced am I of its utility in composts for every description of soil, except that of its own character, that wherever it can be laid down on a farm at less than 4*s*. per ton, I should recommend every agriculturist and horticulturist that can command it, even at the cost here stated, to give it a fair trial. So retentive and attractive of moisture is peat, that if liberally applied to an arid, sandy soil, that soil does not burn in a dry season, and it so much improves the texture and increases the produce of an obdurate clay soil, if in other respects rightly cultivated, that actual experience alone can fairly determine its value.

For the conveyance of night-soil and urine, we have the largest and strongest casks, such as oils are imported in; the top of which is provided with a funnel to put the matters through, and the casks are fixed on wheels like those of a common dung-cart. For the convenience of emptying this carriage, the compost heaps are always lower at one end; the highest is where we discharge the contents, in order that they may in some degree spread themselves over the whole accumulation: the situation on which the wheels of these carriages stand while being discharged is raised considerably; this we find convenient, as the compost heap may be sloped six or seven feet high—low compost heaps, in my opinion, should be avoided. The plan here recommended I have carried on for some time. I find no difficulty in manuring my farm over once in two years; by this repetition I keep up the fertility of my land, and it never requires more than a moderate application of manure.

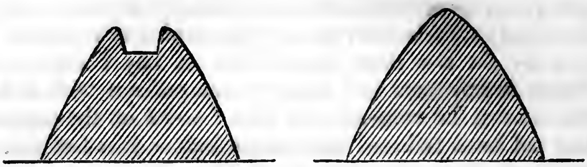
I am fully aware that there are many localities where neither peat nor night-soil can be readily obtained; but it is worth a farmer's while to go even more than twenty miles for the latter substance, provided he can have it without deterioration: the original cost is often trifling. On a farm where turnips or mangold are cultivated to some extent, the system here recommended will be almost incalculably advantageous; a single horse is sufficient

for one carriage—mine hold upwards of a ton each; 6 tons of this manure in compost with peat, or, if that is not convenient, any other matters, such as ditch scourings, or high headlands which have been properly prepared and laid dry in a heap for some time, would be amply sufficient for an acre of turnips or mangold. This manure is by far the most invigorating of any I have ever yet tried; bones in any state will bear no comparison with it for any crop; but it must be remembered that I write on the supposition that it has not been reduced in strength before it is fetched.

Convenience frequently suggests that compost heaps should be raised on different parts of a farm; but, unless in particular instances, it is well to have them in the yard: in the farm-yard all the urine from the cattle-stalls may be employed with the greatest economy; and be it remarked that the urine from animals, in given weights, is more powerful than their solid excrements.* How important then must it not be to the farmer to make the most extensive and the most careful use of this liquid! It is sometimes carted on the land, but that practice will not bear a comparison with making it into composts in the manner here recommended. Great waste is often made in putrescent manures after they are carted on the land; instead of being immediately covered or incorporated with the soil, we not unfrequently see them exposed for days together in the hot rays of a scorching sun, or to the injurious influences of a dry wind. I have before stated that compost heaps should on many considerations be raised in the farm-yard; still circumstances are frequently such that it is more proper to make them at some distance in the fields; if a headland becomes too high by frequent ploughings or working of the land, in that case it should be ploughed at the time when clover or mixed grass seeds are sown with a white crop, for instance, barley or oats, and clover for the year following: a headland might then be ploughed, and a number of cart-loads of some manure heaped from one end to the other. Immediately after this it should be trenched with the spade (or what is sometimes called digging), and ridged high, in order that an action should take place between the soil and manure; by this means the mass would soon be in a condition for turning over, and any ditch scourings, or other matters which had not in the first instance been used, might now be added to the mixture. The heap should then be allowed to remain closed for a few weeks, then turned over again; at this turning in all probability the mass would be much reduced; if sufficiently reduced, raise the ridge of compost well on both sides, but, instead of its top

* This must be taken with some limitations, for urine contains 90 to 95 per cent. of water; and unmixed dung contains all the salts of urine, besides much mucus and other substances.—W. L. Rham.

being pointed, make a trench or cavity on the top from one end of the heap to the other. This cavity should be made tolerably



retentive of moisture, which may be effected by treading with the feet; carriages of night-soil or urine from the cattle-stalls may then be emptied into the trench, and the bulk of the heap would determine how many were required: this being done, a little earth should be thrown into the trench, and the heap allowed to remain in that state until the middle or latter end of autumn; it will then be ready for another turning; but at this time care must be taken to have the heap well made up at the sides and pointed at the top; in this situation rain will be thrown off, and the compost preserved dry until winter presents some favourable opportunity for laying it on the young clover, wheat, or for making any other use of it which may be required.

The beneficial effects of top-dressing young clovers or mixed grass seeds is scarcely ever regarded with due attention. By this help crops are not only much increased, even 30 or 50 per cent., but they are also ready for cutting much sooner, which in a backward spring gives the stock farmer inestimable advantages for sorting his cattle, and thereby raising manure at his pleasure. The full effects of this practice I first experienced in the dry season of 1826: I had some clovers which had been manured the previous winter; my land was soon covered with crop, and that so vigorous a one, that the hot weather did not overpower it. My cows, that summer, were tied up during the day-time, and in the night they were turned out into the pastures; most of the stock in my district were much distressed from over-heat as well as from being short of food for some weeks; milk yielded little butter, scarcely any for a time was offered in our large market-town:—no doubt that year will be remembered by many gentlemen on the Agricultural Society's committee. I, however, was under no difficulties on account of the season: my clovers produced plenty of food for my cattle, and in return they yielded as much milk and butter as I ever recollect from the same number. I am persuaded that the same satisfactory results would have followed if the same system had been adopted for feeding stock; it was that year my attention was first directed to raising compost heaps from urine. This I now do frequently without the help of

any dung from the cattle-stalls; the same occasion called my mind to another matter well worthy every farmer's attention—I allude to the great superiority of the manure raised in summer soiling to that produced in the stalls during winter.* I verily believe the difference is 50 per cent. unless stock are fed in a great measure during winter with artificial food. In an arrangement for making compost heaps from urine, I would recommend a receptacle to be made at the back of the cattle-stalls just outside the building; this should hold about 20 cart-loads of mould, or any other matters to be employed; if its situation were a little lower than the cattle-sheds all the urine would pass into it, and remain there until the mass is completely saturated, which will be sufficient; when the earthy matters are covered over with it, the compost may then be thrown out and the proceeding again renewed. In order to show part of the benefits of this practice, I beg here to observe that the most foul or weedy mould may be used; the action of the urine, if not reduced by water, is so powerful, that wire-worms, the black slug, many other destroying insects, and all vegetables, weeds, &c. when in contact with the urine for a time are deprived of their living functions. The situation for raising this compost should be protected from the weather by a covering similar to a cart-shed; indeed, the deteriorating influences of rain, sun, and arid winds, on all putrescent manures or compost are so serious, that in my humble judgment it would be worth while to have places under cover where these are usually laid down. The ordinary method of conveying manures on land admits of much improvement. I am now preparing carriages and a moveable railway for this purpose. Where compost is raised in the field, I am confident that I shall be able to effect a saving of 100 per cent. in time, and also a very considerable one in expence: not having my designs yet in actual operation, I cannot at present show any practical results. At no distant time this shall be the subject of another paper. The system here alluded to I have in a forward state of preparation (it being, in my opinion, so well adapted for conveying help to land), also other matters for improving a deficient texture.

I beg to conclude this essay with some observations made

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* The strength and consequent value of all cattle-dung will of course depend upon the nature of their food: if soiled, during the summer, upon clovers, tares, sainfoin, &c. &c., there can be no doubt that the manure will have a proportionately greater effect upon the land than if the beasts be kept in the straw-yard; and, if stall-fed, either in winter or summer, for the purpose of fatting, it will be still better. Thus it was found, on comparing the effects of dung voided by animals fed chiefly on oil-cake with that of store-stock, 12 loads of the former exceeded in superiority of product 24 of the latter.—See 'The Complete Grazier,' sixth edit., p. 103.—F. BURKE.

on a former occasion.—No amelioration connected with the rural art is of more lasting importance than correcting the constitutional defects of a soil. The best horticulturists and market-gardeners are many of them, perhaps, unacquainted with the theory, yet perfectly understand the great results from that practice; and in this particular information they are all of them superior to many practical farmers. How often do we see a stiff soil sterile in a great degree from that cause only; yet in the vicinity of a sandpit and adjoining most bogs there is a considerable breadth of coherent land, which might be made double its present value by judicious and liberal top-dressings of peat, which is also unproductive from causes of a contrary nature! The present poverty of many extensive tracts of land is a manifest exhibition of the want of skill or enterprise of their owners and cultivators.

Hathershaw Lodge, near Oldham,
Lancashire, Feb. 1839.

XIII.—*On Wheel and Swing Ploughs.*—An Essay to which the Prize of Ten Sovereigns was awarded in July, 1839.—By Henry Handley, Esq., M.P.

In the award of merit between ploughs of various construction some difficulty arises, inasmuch as almost every farmer entertains a predilection for one or the other, which he probably uses exclusively, and to which alone his men are accustomed; and it is therefore seldom that the comparative advantages of different sorts can be fairly tested. To enable me to meet this difficulty, I have not only used both swing and wheel-ploughs on my own farms, but have seen them tried in different counties and soils; on clay, limestone, and sandy loam; in wet and dry weather; on clover-ley, stubbles, and fallows; across ridge and furrow, as well as on a level surface; and with skilful and unskilful ploughmen.

It is extremely improbable that, were the one implement in all respects and on all soils superior to the other, such a difference of opinion and practice should have thus long prevailed. It will, therefore, be found that, under certain circumstances, each may have its peculiar advantages. Thus Loudon observes—" Different soils, situations, and uses will, of course, require different kinds of ploughs, though there are undoubtedly some that are capable of a much more general application than others."

I ought to premise that, residing in a county where swing-ploughs are almost invariably used, my predilection has certainly been in favour of that implement; if, therefore, in balancing the advantages and disadvantages of both, I decide in favour of ploughs with

wheels, it is the result of conviction based upon a series of impartial, and I think conclusive, experiments.

I have understood the question to relate to the following ploughs, viz. :—

The *swing-plough*, by which I mean a plough the depth of which is regulated by the line of draught and controlling power of the man who holds it; and

The *wheel-plough*, the depth of which is controlled by two wheels, the one about 12 inches diameter, attached to the beam by a sliding shank and socket on the land side of it,—the other about 20 inches diameter, attached to the furrow side of the beam.

The plough is, mechanically speaking, a portion of a screw or curved wedge forced forward horizontally, with which, in the first instance, the surface of the soil is cleft to a certain depth and width, while the wing or mould-board is so constructed as to lift and deposit the separated portion at a given angle.

The implement which effects these operations with the least power and cost under ordinary circumstances, and which is at the same time most capable of control, I conceive deserves the preference.

The first consideration is the comparative draught requisite to overcome a given resistance, and to execute a given amount of work.

In this primary point, I find that writers on the subject have estimated wheel-ploughs to require a greater power of draught. In theory it might seem that the addition of wheels would add to the draught, but, taking into account the uniform gauge and other circumstances which occur in practice, a different conclusion may be come to, as I shall endeavour presently to show.

As regards the cause of the diminished force required by the wheel, compared with the swing-plough, it appears to me to be principally, if not fully, explained by the more uniform horizontal motion communicated to the share and sole of the former through the regulating medium of the wheels at the fore-part of the beam, which diminish the shocks arising from the continual vibrations of the implement when balanced between the hand of the ploughman and the back and shoulders of the horse. It is not contended that wheels so situated act the part of lessening the friction between the sole and the soil; but they keep the rubbing part more truly to its depth, and maintain its horizontal action more correctly; whereas the horses affect a swing-plough at every step by the irregularity of their proper movement, which has to be counteracted by the effort of the man at the opposite end. Thus conflicting forces are momentarily produced, and continual elevations and depressions of the point of the share take place, together with deviations from the flat position of the sole,

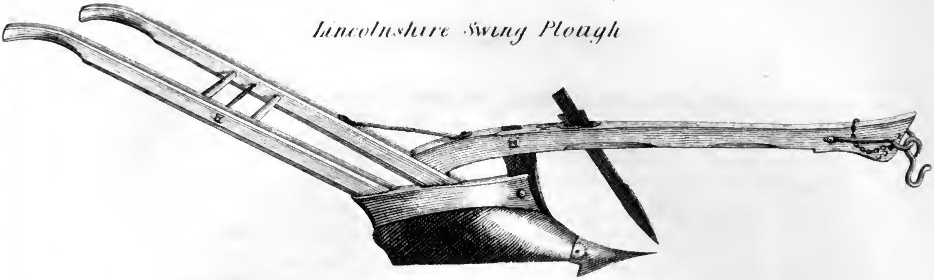
which should be retained at right angles to the perpendicular; and to remedy which, unskilful ploughmen bear unequally on the stilts, which produces a lateral pressure landwards, and consequently a great amount of friction along the whole of the left-side plane of the plough. However small may be the efforts of the ploughman to keep his plough "*swimming fair*," those efforts must be attended with increased resistance, and consequently with increased exertion of the horses.

It is not pretended that in a wheel-plough none of these irregularities of motion exist; on the contrary, the dynamometer shows them to be very considerable, but less in degree than in the swing-plough. The oscillations of the index of a dynamometer are, as might be expected, very great when applied to a plough. The point of a ploughshare may be readily supposed, at one instant, to have burst a sod, which, opening and being raised upwards, offers for several inches but a trifling resistance to its progress; it again meets the obstacle, which is again overcome. It is similar with roots, stones, and other varying impediments, and thus at every step of the horse (whose motion is also a series of impulses) the draught, as exhibited by the dynamometer, is continually and largely varying.

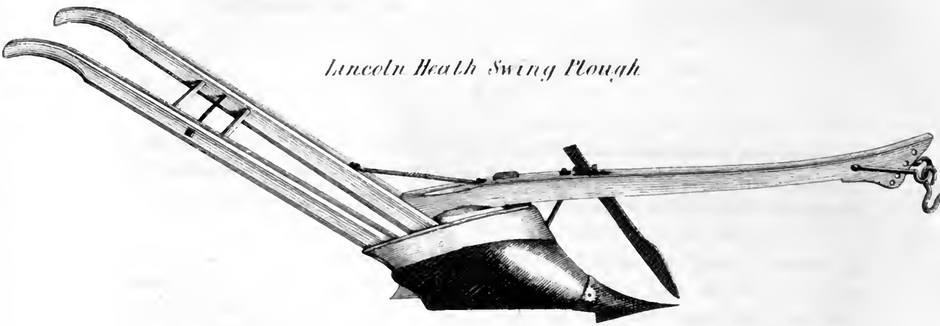
These are effects arising from the nature of animal force and of the soil; they are necessarily common to both ploughs, but appear to be augmented in the swing, compared with the wheel-plough, and sufficiently account for the diminished draught of the latter as shown in the Table of Experiments.

In order to satisfy myself more particularly as to the draught of ploughs, I requested the Messrs. Ransome, of Ipswich, who are the most extensive manufacturers of ploughs in the kingdom, to furnish me with the opportunity of ascertaining the fact in respect of those implements which they themselves had constructed. A stubble-field, of a sandy loam, was selected; partly up and down hill, and partly on a level. The ploughs, all by the same maker, were set to the same gauge, viz., furrows 6 inches deep and 10 wide, drawn by a pair of horses abreast, and held by the best men that could be procured, who were occasionally changed from one plough to another. The instrument employed to test them was a draught-dynamometer, on Regnier's principle, and which had previously been proved, by the suspension of weights, to register with accuracy. This dynamometer consists of two flat plates of steel, of a curved form, and increasing in thickness towards the ends, which unite into solid cylindrical loops, the curved sides of the plates being placed opposite to each other, and the whole forming an entire elliptic spring. On the application of this instrument as a *link* in the line of draught, the oval becomes lengthened in proportion to the degree of force acting on the loops

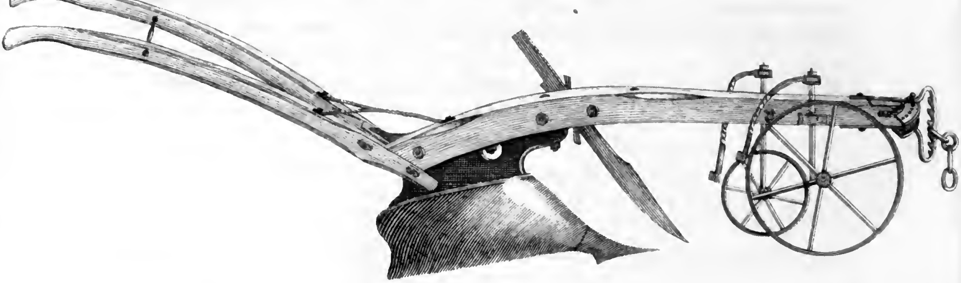
Lincolnshire Swing Plough



Lincoln Heath Swing Plough

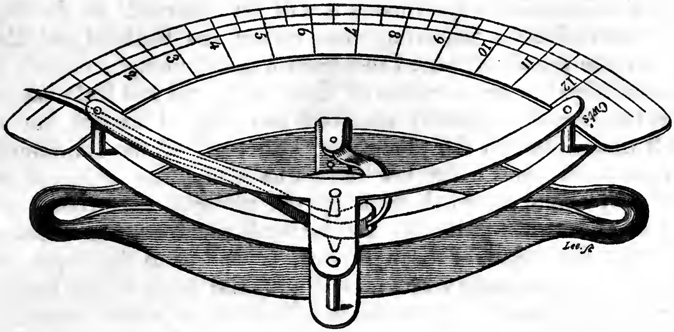


Rutland Plough with Wheels



Bedfordshire Plough with Wheels

Standidge & C° Litho London.



in opposite directions, and the curved sides approach more nearly towards each other accordingly. This degree of approximation in the plates is shown on the scale, in divisions corresponding to half and whole hundred-weights, by means of a cross-rod secured to one plate acting on a crank attached to the opposite one; thus communicating its effect to the lever-index, which, moving over the divisions of the scale, marks the varying degree of force exerted at each moment by the draught to which the instrument is subjected. The index was marked down every few yards, at moments when its oscillation was steady and the draught uniform, and the mean of the whole then taken. The length of the field and back was the trial in each case. It was observed that the inclination or declination of ground made very trifling difference, owing, probably, to the position of the horses acting upon the beam at an inverse angle.

Ploughs tried at Ipswich, November, 1838.

Description of Ploughs.	Maker and Mark.	Weight of each Plough.			Draught.		
		cwt.	qrs.	lbs.	cwt.	qrs.	lbs.
Rutland, with Wheels . .	Ransome. N. L.	1	3	22	2	1	21
Bedfordshire, with Wheels	Ransome. L. L.	1	3	26	2	3	24
Lincolnshire Swing . .	White, with Ransome's Irons. B. M.	1	0	18	3	0	0
Lincoln Heath	Ditto. L. H.	1	1	1	3	0	11

In the foregoing experiments it will be observed, so far from the wheel-ploughs requiring more power, the Rutland and Bedford, as compared with the Lincolnshire swing-ploughs (which are acknowledged to be excellent of their kind, and but little varying from the Scotch), actually required less; and I cannot but remark that, although the ploughing with each of the implements was admirably well done, yet there was a manifest neatness and regularity about the work done by the ploughs with wheels over that of the swing-ploughs; for the land-wheel acts as a lateral gauge to the width of each furrow, as well as to the depth, and therefore the uniformity of width, depth, and angle of the furrow-slice thus produced gave a perfect form to the whole operation. A further fact was established, namely, that the draught of the plough is not increased in an equal ratio with the weight; for on loading the Rutland plough with 112 lbs., or 51 per cent., additional weight, the draught was only increased 33 lbs., or 12 per cent.

The foregoing results have been borne out in a greater or less degree by subsequent experiments on land of greater tenacity, and under different circumstances; and even in the case of a swing-plough, to which wheels were temporarily attached for the occasion, and tried on an adjoining furrow, the draught was proved to be diminished, although the plough was not originally constructed as a wheel-plough, and consequently, from its length of beam and differently-poised bearings, worked under a manifest disadvantage.

The experiments exhibit the *wheel*-plough as requiring a smaller amount of animal exertion than the *swing*-plough; indeed, the tractive force of the Rutland wheel-plough appears, by the table, to have been less than that of the best experiment of the Lincolnshire swing-plough by 23 per cent.; and which is, I think, to be accounted for in the way I have before noticed. A second property of the wheel-plough—viz., that it demands less skill in the ploughman—is on all hands acknowledged; and that it performs its work equally well with the swing-plough is not, I believe, denied by the admirers of the latter implement. I cannot but consider the fact of the wheel-plough demanding less skill in the ploughman to be a considerable advantage on its side, though it receives but little favour amongst first-rate swing-ploughmen, who are accustomed to estimate highly their own manual dexterity, from the circumstance of the quality of their work depending on dexterity alone. Undoubtedly there are many men will make as good work with a swing as with a wheel-plough; but, if we take a district (and it need not be a large one) in which a hundred ploughmen are required, it is more than probable that not ten such will be found. This of itself appears

to me to be a strong argument in favour of the wheel-ploughs. It has been objected that they create a nursery of bad ploughmen, inasmuch as it is in the power of any one to make a good furrow with a wheel-plough, while it tests the abilities of the man to produce the same effect with a swing-plough. When, however, it is called to mind that boys can be instructed at an earlier age in the use of the plough, and enabled to come into better earnings, than they could do otherwise, as well as that a boy at 10*d.* per diem wages may benefit his master by making as good work with the one implement as a man at 2*s.* can execute with the other; and that the advantage shall be attained of an even furrow throughout the field, rarely effected by a gang of swing-ploughs, with depth, width, and angle of inclination, performed with almost mathematical precision; thereby producing an unvarying bed for the seed, and a regular edge for the harrows; the advantage of the wheel-plough can scarcely be estimated too highly, and marks a decided preference.

In Scotland, indeed, the wheel-plough is not approved; and in some parts of the country, where, 30 years ago, it was in use, it has been discontinued, having fallen into disrepute by the supposed friction of the wheels. It must, however, be observed, that at that period, and in Scotland at the present day, the *wrought-iron share* was the only one used. If then we intrust the depth and breadth of the furrow-slice to the wheels, we must take care that the share and coulter do not operate as conflicting forces. If the blacksmith be not extremely careful in laying the share, he may set the point too low, so as by its inclined direction to occasion an excess of pressure upon the wheels, which must proceed horizontally; or, if the point incline a trifle too much to land, or to the contrary side, a counter effort is produced, which tends greatly to increase the draught. This is, however, remedied by the practice of *casting the share,* which must necessarily be alike in shape; and the improved system of case-hardening them on the under side, as invented by the Messrs. Ransome, remedies the evil of wearing thick, to which cast-iron shares were subject when first introduced: and the dynamometer shows that this most important improvement of modern days has had the desirable effect of reducing the draught; to say nothing of avoiding the interminable necessity of sending almost every evening to the blacksmith's shop, to have the shares relaid or sharpened.

I may here mention, in estimating the value of a good swing-ploughman, especially as connected with draught, that in one of my trials I substituted for a first-rate ploughman one who, though no novice, was decidedly his inferior, and who held the same plough for a *bout,* during which he exerted his best abilities, aware of the comparison about to be instituted, and yet the draught

was, in his hands, increased *six per cent.*, and I have no doubt, had he continued to hold the plough for an entire day, it would have been considerably more. This man, though inferior to the other, possessed skill above the average of ploughmen usually employed. Had he held a plough with wheels, there would, probably, have been no difference in the draught between the holding of the plough by himself and predecessor.

In land rendered hard by draught, or stubborn from other causes, I have found the bite of the wheel-plough effective, where the swing-plough could not, without great difficulty, be held in its work;* but of course in the former case the share was set sharp into the ground, and the draught-chain at the highest notch of the hake, which made a heavy pressure upon the wheels. I simply remark on this to show that the wheel-plough is sometimes applicable to hard work, where the swing-plough will not do so well.

On the other hand, there are cases to which the swing-plough is more applicable: I would instance an unequal surface, as on the Wolds of Yorkshire, where the rock lies at varying depths, sometimes within three or four inches of the surface, at others at a greater depth, and where the swing-plough, in skilful hands, may be more readily accommodated to the case. In cross-cutting dead fallows, where the surface is rough and hard clods interrupt the even action of the wheels, they would be better dispensed with. In wet weather on strong land (though I conceive as a general rule it would be better not to work it at all in that state) the wheels are apt to clog, although that inconvenience is materially diminished by the scraper attached to the best constructed ploughs.

In crossing steep ridge and furrow the action of the ascending wheels raises the share out of the furrow, while in descending it plunges it deeper into the ridge. This, however, occurs only in extreme cases, and, to a considerable degree, the same effect attends the swing-plough, unless carefully managed.

As the wheel-plough more particularly treated of in this Essay is, with the exception of the wheels, the same in construction as the swing-plough, *it may be used either with or without wheels, as circumstances require.*

The expense of the implement is undoubtedly in favour of the swing-plough, but the prime cost is matter of comparatively little moment when other circumstances are considered. My experi-

* I have witnessed this upon some very stubborn clay, in which a Kentish turn-wrist did its work well; while a Scottish swing-plough, though held by a very expert fellow, could not be made to keep a regular furrow. The labour was also evidently greater to the ploughman who worked the latter; and the horses appeared to me more distressed than those in the turn-wrist.—F. Burke.

ments have been chiefly confined to the ploughs described in the former part of this Essay.

Of the Suffolk and Norfolk wheel-ploughs on high wheels and gallowses, adapted as they may be to light soils, they are necessarily cumbersome, and constructed with so many conflicting forces that much depends on the skill of the ploughman to adjust them. I have noticed that it is continually necessary to raise or deepen the gallows, which require alteration, on taking out or setting in, each furrow, with beam-bolts, &c., regulating the action to and from land, and consuming much time in their repeated adjustment.

The Kentish ploughs are on a somewhat similar construction, with high gallowses and wheels, but larger and stronger than the before-mentioned: these are said to be necessary to resist the heavy stones which they continually encounter. They are confined to their respective localities. While it is questionable whether they will be much longer retained there, it is certain they will not become general in other parts.

The facts detailed in this paper are founded on practical and careful experiment. The result arrived at in my own judgment is forced upon me by conviction, and I have only to add that I shall be equally open to the influence of opposing facts, if founded upon actual and well-attested experiment.

XIV.—*Account of Liquid Manure.*—An Essay to which the Prize of Ten Sovereigns was awarded in July, 1839.—By Cuthbert W. Johnson, Esq., of Gray's Inn, Barrister-at-Law.

Liquid manure, the subject of our Society's premium, is not a mode of fertilizing the land altogether of modern origin, for a fermented mixture of water and night-soil has, from a very early period, been employed by the Chinese farmers; those of Italy certainly practised irrigation in the days of Virgil (Georgics, book i., v. 106-9), and Cato adds that they employed a mixture of grape-stones and water to fertilize their olive-trees (book xxxvii.). Columella praises very highly the use of putrid stale urine for vines and apple-trees (book ii., c. 15), commending also the lees of oil for the same purpose. More modern agricultural authors have united in praising various liquid preparations; thus Evelyn (whose ingredients most of the authors recommend), in his Treatise on Earth (p. 123-60), gives several recipes, some of which have served as the basis for recent modes of preparing liquid manure, such as the dung of cattle, urine, *salt and lime*, and nitre. Of these artificial mixtures, salt one part, and lime two parts, mixed together and allowed to remain in a heap for two or three months

(Mr. Bennett turns it over three or four times in this period), is fully equal, if not superior, to any thus recommended, most of which I have tried. When mixed with water and spread over land intended for wheat, at the rate of from 25 to 35 bushels of the salt and lime to 10 or 15 tons of water per acre (and it answers very nearly as well when carried on the land dry), excellent results are produced. The wheat which I have thus grown on clover-leys has been superior, in height and strength of straw, to any I have seen produced under different modes of treatment, and the seed very bright and heavy.

All substances, whether organic, earthy, or saline, which are employed to fertilize the soil, or become the food of plants, can only be rendered thus serviceable to vegetation when they are presented to the roots of plants in solution, or in a fluid state; and although this may appear at first rather a sweeping position, yet such is the real fact, the compost of the farm-yard, the crushed bones of the turnip cultivator, the oil and bones of fish, the gypsum of the grazier, the earths, lime, magnesia, and even silica, and all the saline manures, are dissolved by some process or other before they can be absorbed by vegetables. Every attempt which has been hitherto made to make plants imbibe the most minutely divided powders which chemistry can produce, has been entirely fruitless. Davy ineffectually tried the finest impalpable powder of charcoal, and with much perseverance I have fruitlessly employed the earths, saline substances, and organic matters, for the same purpose.

This absolute necessity for every substance which is the food of plants being of a soluble nature did not escape the sagacity of the early Greek and Egyptian philosophers; it is true they carried their conclusions with regard to subjects of natural philosophy too far, as in this instance, when they asserted that water is the only food of plants; yet they must have patiently noticed many facts in vegetable economy, unaided as they were by the light of modern vegetable chemistry, before they could have arrived at a conclusion so nearly approaching the truth. The idea was probably of Egyptian origin, for the cultivators of that country could not fail to notice the magic fertilizing powers of the waters of the Nile, whose annual overflow is perhaps the most extensive natural irrigation taken advantage of by the cultivators of the earth.

The same wild dream of water being the sole food of vegetables was again revived, so lately as 1610, by M. Van Helmont, a celebrated Dutch chemist, who made some very plausible, deceptive experiments on a willow-tree, which he watered only with rain water; researches, however, whose inaccuracy (owing principally to rain-water, as usually collected, not being quite pure) was shown in 1691, by Mr. Woodward. Although, therefore, it is

now well ascertained that water is not the only food of plants, yet it certainly contributes universally and largely to their support; and, as it has been well observed by Davy, no manure can be taken up by the roots of plants unless water is present; and water, or its elements, exists in all the products of vegetation.*

It must not, however, be concluded that these carefully considered conclusions, from the results of often-repeated laborious experiments, are erroneous, because transparent water, *apparently* pure, as in water-glasses, or in irrigation, promotes the growth of bulbs, grass, &c., since the very purest spring-water, even rain-water, contains foreign substances, as I have clearly ascertained by experiment; and when only chemically pure water is employed to water plants, they cannot be made to flourish. I have fruitlessly varied the attempt in several ways. All the experiments of Dr. Thomson were equally unsuccessful, the plants vegetating only for a certain time, and never perfecting their seeds. Similar experiments were made by Hassenfratz and Saussure, and others, with the same unfavourable result. Duhamel found that an oak which he had raised from an acorn, in common water, made less and less progress every year. The florist is well aware that bulbous roots, such as hyacinths, tulips, &c., which are made to grow in water, unless they are planted in the earth every other year, at first refuse to flower, and finally even to vegetate. Moreover, it has been unanswerably shown by many very accurate experiments,† at the varied repetition of which I have personally assisted, that the quantity of nourishment or solid matters absorbed by the roots of plants is always in proportion to the impurity of the water with which they are nourished; thus some beans were made to vegetate under three different circumstances: the first were grown in distilled water; the second were placed in sand and watered with rain-water; the third were sown in garden-mould. The plants thus produced, when accurately analyzed, were found to yield the following proportions of ashes :—

1. Those fed by distilled water . .	3.9
2. Those fed by rain-water . . .	7.5
3. Those grown in soil . . .	12.0

And again all attempts to make plants flourish in the pure earths have failed utterly when they have been watered with pure water; yet a totally different result I have invariably experienced when I have employed an impure solution or liquid manure. My trials have been entirely supported by those of M. Giobert, who, having formed of the four earths, silica, alumina, lime, and magnesia, a soil in the most fertile proportion, in vain essayed to make the

* Lecture 15.

† Rech. sur la Vég., 51.

plants flourish in it when watered with pure water only; but every difficulty was removed when he moistened it with the water from a dunghill, for they then grew most luxuriantly; and M. Lampadius still further demonstrated the powers of such a foul liquid manure, for he formed plots composed of only a *single earth,* pure lime, pure alumina, pure silica, and planted in each different vegetables, watering them with the liquid drainings from a dunghill, and he found that they all flourished equally well. The soluble matters of a soil ever constitute, in fact, its most fertilizing portion; and if by any artificial means the richest mould is deprived of these, as by repeated washings in cold or boiling water, the residuum, or remaining solid matter is rendered nearly sterile: this fact, first accurately demonstrated by M. Saussure,* I have since confirmed by a variety of experiments of my own.

The soluble matters or liquid manures consumed by plants are sometimes imbibed by their roots unaltered,—in other cases they are decomposed during their absorption. The earths, gypsum and other salts, are instances of the first class; oil, and other purely animal matters, of the last. Davy found that some plants of mint which he forced to vegetate in sugar and water, apparently absorbed the sugar unaltered, for they yielded a considerably larger proportion of a sweetish vegetable extract than those of the same weight which he had grown in common water; and it is an ascertained fact that the roots of plants will absorb or reject the various earthy substances of a soil, or even when placed in a saline solution, in a very remarkable manner; thus, when equal parts of gum and sugar were dissolved together in water, and some perfect plants of polygonum persicaria placed with their roots in the solution, it was found that they absorbed thirty-six parts of the sugar, but only twenty-six of the gum; and when in precisely the same proportions and manner Glauber salt, common salt, and acetate of lime were used, then it was found that the roots of the persecaria separated these salts from the solution with much ease, absorbing 6 parts of the Glauber salt, 10 parts of the common salt, but not a trace of the acetate of lime.†

These facts will not be uninteresting to the irrigators or occupiers of the English water-meadows, since they may in some degree serve to account for the beneficial action of water on such lands—a question not nearly so well understood as it ought to be, and on which widely differing opinions are commonly held by practical farmers. It is a theme intimately connected with the subject of this paper, for irrigation is, in truth, a mode of applying the weakest of liquid manures, on a very bold scale, to grass-lands.

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* Rech. 150. † Thomson, vol. iv. p. 321.

Almost every farmer has a mode of accounting for the highly fertilizing effects of irrigation. Davy added another to the list of explanations. He thought that a winter-flooding protected the grass from the injurious effects of frost; he examined with a thermometer, and with his usual address, the water-meadows near Hungerford in Berkshire, and ascertained that the temperature of the soil was ten degrees higher than the surface of the water, and that too on a frosty March morning. He remarked, also, a fact that most farmers will confirm, that those waters which breed the best fish are ever the best fitted for watering meadows.*

Such were the opinions of Davy as to the fertilizing properties of water. It is to be lamented that the agricultural opportunities for observation of this great chemist were so few, for his valuable remarks were always cautiously made. He appears, however, never to have steadily investigated the chemical composition of river-water, with regard to its uses in irrigation, and in consequence he knew little of the value of some of its impurities to vegetation. Thus, if the river-water contains gypsum (sulphate of lime), which it certainly does if the water is *hard*, it must, under ordinary circumstances, on this account alone, be highly fertilizing to meadows, since the grasses contain this salt in very sensible proportions. Calculating that one part of sulphate of lime is contained in every two thousand parts of the river-water, and that every square yard of dry meadow-soil absorbs only eight gallons of water, then it will be found that by every flooding more than one hundred-weight and a half of gypsum per acre is diffused through the soil in the water, a quantity equal to that generally adopted by those who spread gypsum on their clover, lucern, and sainfoin crops as a manure, either in a state of powder, or as it exists in peat-ashes.

And if we apply the same calculation to the organic substances ever more or less contained in flood waters, and if we allow only twenty-five parts of animal and vegetable remains to be present in a thousand parts of river-water, then we shall find, taking the same data, that every soaking with such water will add to the meadow nearly two tons per acre of animal and vegetable matters, which, allowing in the case of water-meadows five floodings per annum, is equal to a yearly application of ten tons of organic matter. The quantity of foreign substances present in river-water, although commonly less, yet very often exceeds what I have calculated to exist.

I have found it impossible to give from analysis the amount of the foreign substances, under ordinary circumstances, present in river-waters, with any tolerable accuracy, since the proportion not

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* Agricultural Chem. p. 352.

only varies at different seasons of the year, but a considerable proportion of the merely mechanically suspended matters invariably subsides when the specimen water is suffered to rest, so that the chemical analysis is in fact merely that of those portions in chemical combination: to give an instance of this, Thames water usually contains from 1 to 2 per cent. of mechanically suspended matters; yet, when this water was analysed by Dr. Bostock, 10,000 parts were found to contain only about $1\frac{3}{4}$ parts, namely,

Organic matters	0·07	parts
Carbonate of lime (chalk)	1·53	„
Sulphate of lime (gypsum)	0·15	„
Muriate of soda (common salt)	0·02	„

And in the same quantity of the water of the Clyde, Dr. Thomson found only a little less than $1\frac{7}{3}$ part, namely,

Common salt	0·369	parts
Muriate of magnesia	0·305	„
Sulphate of soda (Glauber salt) . . .	0·114	„
Carbonate of lime (chalk)	0·394	„
Silica (flint-earth)	0·118	„

There is no stream more celebrated for its prolific water-meadows than the Itchen, in Hampshire; and in no part of England is the system of irrigation better understood and more zealously followed. I have several times examined the water of this river, taken from above the city of Winchester: it contains in 10,000 parts, after all its mechanically suspended matters have subsided, about $2\frac{2}{3}$ parts, namely,

Organic matter	0.02	parts
Carbonate of lime (chalk)	1·89	„
Sulphate of lime (gypsum).	0·72	„
Muriate of soda (common salt) . . .	0·01	„

The water of lakes is usually still more surcharged with foreign substances than those of rivers; and from the use of such waters, especially if an occasional or winter stream of water passes through them, I have witnessed great fertilizing effects produced on meadow-land.

In my conclusions with regard to the theory of irrigation, I have found many able practical farmers concur. Thus, Mr. Simmonds, of St. Croix, near Winchester, considers that the great benefit of winter-flooding for meadows is derived, in the first place, from the deposits made by the muddy waters on the grass; and, secondly, from the water covering the grass, and preventing the ill effects arising in the winter from the sudden transitions in the temperature of the atmosphere. This gentleman is perfectly

aware of the value of the addition of the city drainage of Winchester to the fertilizing qualities of the Itchen river-water, and of its superiority for irrigation after it has flowed past the city, having water-meadows both above and below the town; and he finds that, if the water has been once used for irrigations, that then its fertilizing properties are so materially reduced that it is of little value for again passing over a meadow; and so convinced is he of this fact, by long experience, that, having in this way long enjoyed the exclusive and valuable use of a branch of the waters of the Itchen for some grass-land, a neighbour higher up the stream followed his example, constructing some water-meadows, and using the water before it arrived at those of my informant, who, in consequence, found the water so deteriorated in quality (though not sensibly diminished in quantity), that he had once thoughts of disputing the right with his more upland neighbour.

The employment of artificially-prepared liquid manure (though little known at present in England) is very extensive on the Continent: the Swiss farmers call it *gulle;* in France it is denominated *lizier;* and by the Germans, *mist-wasser.* They prepare it throughout many of the German states, and in the Netherlands, by sweeping the excrements of their stall-fed cattle into underground reservoirs, mixing with it four or five times its bulk of water, according to the richness of the dung: five reservoirs are generally employed, of such a size that they each take a week to fill; and thus each has four weeks allowed to ferment before the mass, which in this time becomes of an uniform consistence, is removed, by means of a portable pump, in water-carts, or large open vessels. A similar plan is adopted in the north of Italy, and from time out of mind has been practised by the Chinese. In that empire, however, the cultivators chiefly employ night-soil, which is made into cakes for this purpose with lime or clay, in all their large cities, to prepare their liquid manure.

It is from long experience, an admitted fact among the German farmers, that there are no manures so powerful in their operation as those which are liquids, such as human urine or bullocks' blood; so that no English farmer need fear deception as to their asserted value. This very fact was submitted some years since to the consideration of Professor Hembstadt, of Berlin, by the Saxon and Prussian authorities, who were anxious to apply the contents of the city drains towards fertilizing the barren lands in the neighbourhood of Dresden and Berlin. This talented agriculturist undertook, in consequence, a series of valuable experiments, which, varied in every possible way, were carried on for a considerable period; the result of them, so highly advantageous to the prosperity of Germany, Hembstadt then published. They were repeated with

unvaried success by Professor Schübler, and the results may be stated in the following order.

If the soil, without any manure, yield a produce of three times the quantity of seed originally sown, then the same quantity of land will produce—

5 times the quantity of seed sown, when dressed with old herbage, grass, leaves, &c.
7 times, when dressed with cow dung.
9 times, with pigeons' dung.
10 times, with horse dung.
12 times, with *human urine.*
12 times, with *sheep's dung.*
14 times, with human manure, or *bullocks' blood.*

Thus, it will be seen, that, of seven usually employed fertilizers, the liquid manures, urine and blood, were found to be decidedly the most powerful.

Both with regard to the quantity of liquid manure applied per acre, and the mode of spreading it, much must depend upon the circumstances under which the cultivator is placed, and the richness of the liquid he employs. If the impurities dissolved, or mechanically suspended in the water, are equal to 1 part in 10, then 20 to 30 tons per acre of the liquid manure I have found amply sufficient, under ordinary circumstances, to produce the most excellent results; if the fluid mass is purer, then more must be applied. For gardens, and small plots of ground in general, the liquid may be readily and evenly distributed over the beds by means of a watering-pot or garden-engine; for fields it must be carried in water-carts, and distributed either by being let into a transverse trough, pierced with holes in the manner of those employed for street-waterings, or the Flemish plan may be adopted, (especially when the manure is of too considerable a thickness to flow readily through holes) of taking it into the fields in the water-carts, open at the top, (furnished with slight moveable covers,) and then distributing it out of the cart very evenly by means of a scoop; and I have invariably perceived the advantage of ploughing the liquid into the soil *as soon after it was spread on the land as possible.* The cultivator will find great advantage if he uses the garden-engine, watering-pot, or cart, from straining the liquid manure, before he pumps it out of the reservoir, either through straw, coarse sand, or a basket; the pieces of straw, and other coarsely divided-matters thus separated by the strainer, he will discover add very slightly to the fertilizing powers of the liquid, and yet they all materially hinder the even distribution of the manure.

The expence, per acre, of such an application of liquid manure, I thus estimate, supposing the cow-herd to be employed:—

	£.	s.	d.
Three tons of cow or other fresh dung . .	0	18	0
Labour in mixing and occasionally stirring it with from 20 to 25 tons of water . .	0	2	0
Carting, and spreading it on the field . .	0	8	0
	£1	8	0

If it shall occur to the farmer, that the quantity of solid manure thus added to the soil will not, in reality, much exceed two tons per acre, and that this is, in appearance, a very small allowance, I would remind him, that the quantity thus conveyed consists of the soluble or richest portion of the manure, and is, in fact, the extract without any of the straw, or other inert residuum usually carried on to the soil; besides, it is a very erroneous, though common conclusion, that to produce fertility a manure must be used in large quantities. I have observed in this paper, that a flooding with river water, so productive of heavy crops of grass in the water meadows, does not carry on to the land more than two tons per acre of animal and vegetable substances; and, in the successful experiments of the late Lord Somerville, at Fairmile, with whale blubber, not more than a ton and a half per acre were applied. The Essex farmers find three-quarters of a ton of sprats amply sufficient; and two cwt. per acre of gypsum is the ordinary successful allowance for grass land. The exact evenness, therefore, with which a manure is spread over the land is a highly important consideration as regards the economy of manures. There is no commonly cultivated plant which more delights in liquid manure than the potato. It naturally luxuriates near to wet ditches: on plots which have received the drainage of a dunghill it grows with the greatest rapidity. I have invariably found that, to any liquid mixture intended as a manure for potatoes, the addition of five or six bushels of salt per acre is productive of great good, both as regards the quantity and quality of the potatoes.

On clover leys intended for wheat, the liquid should be turned into the soil as early as possible after it is spread; and if this operation is performed in moist cloudy weather, a very material advantage will be perceptible in the succeeding crop. The warmth of the sun is certainly prejudicial to the thinly-spread liquid manure, composed of finely-divided animal and vegetable substances.

Of the tanks for receiving or preparing the liquid manure, I may remark that I have always found them best made of flints or

bricks set in good mortar or Parker's cement;* they may be *bedded* in clay, but I would not advise the use of clay for the brickwork, since worms are sure eventually to penetrate through it; and I advise the shape to be something like a decanter, larger at the top than at the bottom, in the manner introduced at Eastbourne, and in Cornwall, chiefly by the advice of Mr. Davies Gilbert.

To the presence of a large proportion of urine, the richest of liquid fertilizers, must be chiefly attributed the luxuriant effects produced by the liquid manure, as prepared on the Continent, and from the use of the sewerage matters of large towns, as so strikingly proved in the case of the Craigintinny water-meadows, near Edinburgh, where the drainage is employed in the state in which it issues from the sewers, and from whose use several crops of the most luxuriant grass are annually obtained. "All urine," said a late distinguished chemical philosopher, "contains the essential elements of vegetables in a state of solution." By a careful analysis, the human variety of this fluid, in its fresh state, was found, by Berzelius, to contain the following substances:—

Water	93·300
Urea (the peculiar animal matter of urine) .	3·010
Sulphate of Potash	0·371
Sulphate of Soda	0·316
Phosphate of Soda	0·294
Common Salt	0·445
Phosphate of Ammonia	0·165
Muriate of Ammonia	0·150
Lactate or Acetate of Ammonia . . .	1·714
Lactic or Acetic Acid	
Animal matter, soluble in Alcohol . .	
Inseparable Urea	
Earthy Phosphate (Earth of Bones) with Fluate of Lime	0·100
Uric Acid	0·100
Mucus of the Bladder	0·032
Silica (Earth of Flint)	0·003
	100

Thus it will be seen that there is hardly a single ingredient found in urine which is not either a direct food for vegetation, or furnishes by its decomposition a supply in another form; for in it are thus detected the ammoniacal salts of the dunghill, the phosphate

* See 'Flemish Husbandry:' by the Rev. W. L. Rham, M.A.—(Farmers Series, Library of Useful Knowledge.)

of lime of bones, as well as of many cultivated vegetables, and abundance of easily decomposable animal matters.*

The urine of the horse is nearly as rich in animo-vegetable matters; its composition, according to the experiments of Fourcroy and Vauquelin, is as follows:—

Water and Mucus	94·0
Urea	0·7
Carbonate of Lime (Chalk)	1·1
Carbonate of Soda	0·9
Benzoate of Soda	2·4
Muriate of Potash	0·9
	100

The following are the constituents in that of the cow, as found by Professor Brande:—

Water	65·0
Urea	4·0
Phosphate of Lime	3·0
Muriates of Potash and Ammonia	15·0
Sulphate of Potash	6·0
Carbonates of Potash and Ammonia	4·0
Loss	3·0
	100

It would appear, from some experiments of Dr. Belcher, that the ammoniacal salts of urine have a forcing or stimulating power which considerably hastens the vegetation of plants. His experiments were made with the common garden cress; and, in his trials, some plants nourished with a solution of phosphate of ammonia were fifteen days forwarder than plants growing under similar circumstances, but watered with plain water. In some experiments of Mr. Gregory, who watered half a grass field at Leyton with urine, the portion thus treated yielded nearly double the quantity of hay produced by the other unmanured portion; and the use of the urine of the cow, so extensively employed for grass lands, and in the garden and orchard, by Mr. Harley, in the neighbourhood of Glasgow, was attended with results equally satisfactory, producing, when diluted with water or

* The respective properties of animal urine depend much upon the nature of the food upon which the creatures are nourished; and its effects upon the land are consequently different: thus, it has been found weaker when taken from cows fed upon white turnips than upon Swedes, and still weaker from cut grass; while that produced in the distilleries is comparatively better than either of the former.—F. Burke. See Quart. Journ. of Agric., No. XIX. p. 96.

soap-suds, very superior crops of grass on land of a very inferior description.*

I shall conclude with a few observations on the loss which the cultivated lands of England incessantly sustain from the liquid manure of the sewers of her cities and large towns—a question to which I have before alluded in this paper, and which is not nearly so well understood as is desirable. Thus, by carefully conducted experiments and very accurate gaugings, it has been found that the chief London sewers convey daily into the Thames about 115,000 tons of mixed drainage, consisting, on an average computation, of 1 part of solid and 25 parts absolutely fluid matters; but if we only allow 1 part in 30 of this immense mass to be composed of solid substances, then we have the large quantity of more than 3800 tons of solid manure daily poured into the river from London alone, consisting principally of excrements, soot, and the debris of the London streets, which is chiefly carbonate of lime: thus, allowing 20 tons of this manure as a dressing for an acre of ground, there is evidently a quantity of solid manure, annually poured into the river, equal to fertilizing more than 50,000 acres of the poorest cultivated land! The quantity of food thus lost to the country by this heedless waste of manure is enormous; for, only allowing one crop of wheat to be raised on these 50,000 acres, that would be equal to the maintenance (calculating upon an average produce of 3 quarters of wheat per acre) of 150,000 persons. London, too, is only one huge instance of this thoughtless waste of the agricultural riches of the soil of England; from every other English city, every town, every hamlet, is hourly passing into the sea a proportionate waste of liquid manure; and I have only spoken of the solid or mechanically suspended matters of the sewerage; the absolutely fluid portion is still rich in urine, ammoniacal salts, soda, &c., when all the mechanically suspended matters have been separated from the other portion. According to very careful experiments this fluid part often contains 16 per cent. of animal matters, salts, &c., intimately or chemically combined with the water.

No farmer, after such an analysis of the sewerage of a large city, can feel surprised at the important results from the use of that sewer water, as long practised in the vicinity of Edinburgh. After learning the composition of such a foul mass—its endless mixture of organic matters—its soot—its carbonate of lime—and,

* It appears, in some extensive experiments made in Scotland, not to have been successful upon arable crops; for, to wheat, sown upon clay-land, it did no good; to barley it was found injurious; potatoes were grown to a large size, but were watery and unfit for the table; and, on turnips, it was found not half so efficient as mere fermented dung.—F. BURKE. Quart. Journ. of Agric. No. XIX.

above all, its urine, the forcing nature of the ammoniacal salts which that fluid contains, added to the presence of the other matters which are the food of plants, and the constant supply of such irrigation water in all seasons—he will readily give credence to the talented editor of the "Quarterly Journal of Agriculture," when he asserts that, by such treatment of the Edinburgh meadows with the sewerage irrigation, they have been increased in value several pounds per acre, yearly.*

I have often employed, with decided effect, in my own garden, for vines, peach and standard apple-trees, liquid manure, prepared either by mixing one part by weight of cow-dung with four parts of water, or the collected drainage of the stable and cowhouse. Of these the vine is by far the most benefited by the application; but to whatever fruit-tree the gardener has occasion to apply manure, there is no form so manageable and so grateful to the plant as the liquid. It has been found advantageous to plants cultivated in stoves to apply even a liquid manure, composed of six quarts of soot to a hogshead of water; and although this is a very unchemical mixture, yet it has been found by Mr. Robertson to be peculiarly grateful and nourishing to pines, causing them to assume an unusually deep healthy green; and for stoved mulberry, vine, peach, and other plants, the late Mr. Knight, of Downton, employed a liquid manure, composed of one part of the dung of domestic poultry, and four to ten parts of water, with the most excellent result—the trees maintaining, at the end of two years, "the most healthy and luxuriant appearance imaginable." †

In whatever way we view the question of liquid manure, to which our Society now directs the attention of the English farmers, an abundant field of research presents itself on every side: it is evidently an investigation likely to amply repay the cultivator for the labour he may be induced to bestow upon it. By such manures nourishment for vegetation is more equally diffused through the soil, and becomes more speedily serviceable to the crop, than by any other mode of cultivation. I have endeavoured, also, in this paper, to convince the farmer of what I have long remarked in my own practice—that a much smaller quantity of manure, if uniformly mixed with land, is sufficient for all the purposes of fertilization than is commonly believed. Such investigations must be of the highest interest to the farmer and to the public in general, for they relate to the increased produce of the land of England; and not only does a fortunate experiment carry with it its own reward, but even an unsuccessful one is not without its advantages—it serves, at least, as a beacon to other cultivators, and affords that satisfaction which ever accompanies the acquisition of knowledge.

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* Practical Irrigator. † Trans. Hort. Soc. v. ii. p. 127.

XV.—*On Drawing Turnips.*—An Essay to which the Prize of Ten Sovereigns was awarded in July, 1839.—By RICHARD HOPPER, Esq.

THE growing of turnips during the last sixty years has given a greatly increased value to the lighter soils in Great Britain. It has imparted also a new character to agriculture itself. The Society can, therefore, scarcely confer a greater favour on the cultivators of land, than by bringing under their consideration the various modes of management applicable to this valuable root, both as to its growth, and as to its consumption.

Although an inquiry in regard to the best mode of cultivating the turnip is not included in the several questions to which the attention of the competitors is directed, yet this Essay might appear incomplete, did it not premise that much of the advantage to be derived from the growing of turnips will depend upon the particular mode of their cultivation. Nor must this matter be overlooked in connexion with the "drawing and carrying away" of the crop; because the facility of that work will, in a great measure, depend upon the plan which has been adopted in its growth. If, however, the land require cleaning or pulverizing; if the farmer seek after a quick growth, and comparative security against the ravages of the fly; or, if he would provide the means for drawing and carrying off the produce, without injury to the land, or to his future crops;—he will find all these objects attainable by the making of ridges at 27 inches' distance, so as to admit the wheels of a cart in the spaces beyond 2 rows of plants. This space will, moreover, be found to be rightly adapted for the ready and unequalled operation of the horse-hoeing system.

The first inquiry as to the "best mode of drawing and carrying turnips, both from light and heavy soils," makes no distinction whatever as to the different modes of cultivation. If the old, broad-cast plan be retained, no mode of drawing and carrying off can be suggested which will not be injurious on every description of land, whether light or heavy. On that plan, even should the crop be only partly drawn off, the plants must be exposed to damage from their irregular position, as well as by the treading of the horse. Were the crop sown on ridges, at the distance as above named, the cart would proceed in the spaces between the ridges, without damage to the plants or inconvenience to the work. Taking for granted, however, that the old broad-cast plan of sowing were to be followed, the best mode of drawing and carrying away would be, by drawing the turnips on the half of two lands, from the furrow to the ridges; then laying them in proper heaps on each side; and, at last, by taking a cart down the furrow, for the purpose of the several heaps being loaded and carried away.

Whether the crop be only drawn off in part, or whether it be entirely carried away, the plan now proposed will, it is thought, be the best mode which, under the circumstances, can be adopted, either in reference to light soils, or to those of a heavier character.

The next subject refers to " the means of avoiding injury to the future crops from cutting up the land in carting, more particularly in clay soils." This injury cannot be more effectually prevented than by adopting the mode of drawing and carrying away, as just proposed. Were the ridging system, however, to be adopted—which every good farmer will, as far as practicable, put into use—the evil referred to might be entirely prevented. I might, therefore, answer this inquiry by saying, that the best means of avoiding any injury, both to the crop of turnips and to those which succeed, would be, by putting into practice the system of ridges at proper distances. The operations of hoeing and weeding, and then those to follow, by the cutter and the mould-board plough, having entirely disencumbered the plants of all weeds, turned up the soil to the ridges, and deepened also, sufficiently, the spaces between them, no damage whatever need be apprehended, either by the wheels of the cart or the movement of the horse. Indeed, the work of carting and carrying, under this system, may be the means of destroying any small remaining weeds of sudden growth in the spaces; and, by the raising of the soil up to the ridges, it will not only offer an opportunity for the crop being thoroughly cleaned, but the soil having been often worked over, and exposed to the action of the weather, it will arrive at that mellow, pulverized state which is necessary to the securing of a future crop.

We now proceed to consider " the best mode of supplying the loss of manure, arising by the turnips not being consumed on the land." The best application of manure for the purpose of providing food for the coming plant consists, in not only providing a proper distribution of the stimulus, but in applying it also in such a mode as that the greatest portion of it shall be placed within reach of the plants, for the gradual support of their growth. Such is the peculiar advantage of those finer and more pulverized manures, of artificial application, which find their way most speedily to the roots of plants—such as burnt soil, bone-dust, rape-dust, or fresh soil, salt, &c. Now these manures can be applied by drilling and other modes, within such prescribed bounds as to come exactly in contact with the plant, not being dispersed uselessly over such parts of the field where the stimulus would, at least, be useless for a time. The greater portion of the manures above named may be drilled in, along with the seed itself, so as to fall in its immediate vicinity, within reach of its vivifying action, so as to draw from it the hidden principle which stimulates to production. Such is the plan with the drilling of wheat, barley, turnips, &c.;

and such is the mode also in covering the manure with the moulding-plough, and then dropping the turnip-seed so as to fall immediately above it. In order to provide the manure, however, for this judicious application of management, it must be collected into a mass; it must be placed under the control of the farmer to be divided and directed in the most effective manner—not scattered to the winds—not to be exhausted by the evaporation of a scorching summer sun! Now, when turnips are consumed on the land, it is clear that the droppings of animals must be accidental, without regard to proper distribution or direction. Thus even also with regard to sheep, which are of such vast importance to the improvement of turnip land: their predilection for the sheltering fence will not unfrequently betray the partial distribution of the improvement they leave. With regard to clay soils, however, which are referred to more particularly, and which may at times bring a crop of turnips, it seldom happens that the nature of the soil will admit of the turnips being eaten off by sheep, and if consumed by other stock, the management from such eating must be partial, scanty, and inadequate. Were the crop, however, carted home, and consumed by the various cattle in the straw-yard, or the feeding-shed, or by milch cows, it would, by its admixture with other food, and by its conversion through the process of digestion into manure, far more than compensate for the loss of the turnips not being consumed on the land. In the straw-yard, also, it must be remembered, that the manure is collected into a mass, and can in that state be divided and applied with the greatest precision and effect. It may be stated here, that, in regard to lands which admit of turnips being eaten off by sheep, the more profitable mode of consumption appears to be, to draw and carry home about one-half of the crop for consumption in the fold-yard, stables, and sheds; the remainder of the crop (and particularly of Swedes) will supply an abundance of excellent food for sheep. Swedes may also be sown early in May; and this early sowing gives the opportunity of a second sowing, in case of failure. That man, who has once known the value of a crop of Swedes, will never fail to continue the growing of them: they supply plenty of good food for stock, both at home and abroad. There has been a patent turnip-cutter lately introduced by Gardner, which, with but little labour, does the work admirably, and which enables even lambs to feed off Swede turnips with advantage.

Proceeding to the fourth division of the subject—as to the "comparative progress of stock in fattening or thriving, when consuming drawn turnips, or those still on the land"—all persons conversant with the feeding of stock are aware of the great advantage of giving a proper variety of food to beasts put up for that purpose. The process of digestion, as well as the proper tone of

the appetite, are both stimulated by a well-judged variety. To this consideration may be added, also, the great advantage of sheltering animals from the changes and severity of the weather. Excessive cold not only prevents the growth and improvement of stock, but stints them also as to size. An animal suffering from cold, and shivering beneath the fence, will derive but little improvement from its food. There is probably a proper medium of atmospheric temperature, equally removed from excessive heat and extreme cold, which is required for the bringing out of the most perfect growth of animals.* The black cattle of the North are far below the size and quality of our Lincolnshire, Leicestershire, and Herefordshire stock. By analogy, therefore, it may be concluded that a suitable degree of warmth is beneficial to the growth as well as to the size of animals. Considered in this respect alone, providing that the food were precisely the same, the warmth and comfort which animals enjoy in the fold-yard, sheltered from the cold blast, must have a favourable effect on their thriving and growth. But when to this fact is added, also, the consideration that not only have stock in the yard a suitable degree of warmth, but that they have also a variety of food and a regular supply of it, under a daily and hourly inspection of the superintendent—these advantages will conduce to the thriving of stock, in a far greater degree than could be experienced were they exposed to the severity of the winter in the field, and supported only by one description of food.

With regard to the next subject for investigation, namely, "the comparative quantity and quality of the manure in either of the above modes," it will be admitted, that, in proportion as the animal is in a thriving condition, the manure will be of a proportionably valuable quality. On this account it is that some feeders find the advantage of feeding for the market by meal, cake, turnips, &c., as much by the increased power and value of the manure, as by the profit in price, when cost, labour, expence, and risk, are all taken into account. Turnips being applied to the feeding of stock only as a winter crop, they can only serve the purpose of food during that season; besides which, also, as it regards stock, they are an artificial food, and being thus sustained exclusively by food, which is neither the most natural nor the most congenial, the manure, under such circumstances, will therefore be inferior and of but little value. Besides which, it will be applied by accident—without care, or design, or proper direction. Too much under the fence—too little in the centre of the field—some parts

* The author is mistaken in saying that the black cattle of the North are inferior to the larger breeds in quality. They are smaller, but the quality of their meat is considered in the London markets better than that of any other sort.—Spencer.

favoured by an abundance—others entirely neglected—all left to chance—nothing directed by care, experience, or system. Under the weight of these facts, therefore, it may be assumed, that, in drawing away turnips from the field to be consumed at home, in combination with other food, not only will the quality of the manure as to its strength be greatly improved, but the quantity, also, under proper distribution and management, may be made to produce far more beneficial and abundant results.

The consideration of the foregoing questions in regard to the "drawing of turnips," has been confined to neat stock. When the crop *can* be eaten on the field by sheep, some of the objections above urged will be neutralized. When the land, however, is in sufficient heart to bring a crop of Swedes, and they are sown on ridges, I believe it will be found most profitable to draw off about one-half of the crop, to be eaten in the fold-yard; the other half to be eaten on the field by sheep. The prejudice which has long existed in the minds of many persons against using manure fresh from the yard, for turnips, is now giving way to the force of experience and facts. The writer of this Essay has never failed to have an abundance of Swede turnips (according to seasons), with the using of manure fresh from the yard, after once turning. Sir H. Davy says, that the process of fermentation and putrefaction is pernicious above the surface of the ground, but salutary, when carried on beneath it.

The land being well cleaned and pulverized as early as possible in May, the manure may be led straight away from the yard, having been once turned over a few weeks before, merely for the purpose of its being spread more regularly in the spaces. The ridges should be formed at 27 inches apart, measuring from the middle of the ridge; and this distance provides not only for the free working of the cart-wheels in the proper spaces, but for the working also of the cutter and mould-board plough, to clean the spaces and to earth up the plants in the last operation after hoeing and weeding. As soon as the ridges are formed, the manure is flung down in proper quantities (10 or 12 good cart-loads to the acre) between them, and then spread carefully by women and children, so as not to miss the giving of nourishment to every turnip-plant as it grows. The ridges are then carefully split by the mould-board plough, and all the manure belonging to the day's work covered neatly over in this manner. The sowing should be done the same day. To a barrow-drill may be attached a small roller, and by this plan the seed has the advantage of being forced into growth by the warmth of the fermentation carried on just beneath the surface on which it is deposited.

As to the expence of "drawing the turnips," it will be found

to be comparatively trifling. One man will draw up and lead away from a good crop on ridges (with a one-horse cart) two loads, containing about 25 cwt. each cart. If we estimate a hundred-weight for each feeding beast per day, and half that quantity for other beasts, one man's labour will supply turnip-feeding for a great number of beasts, either folded or tied up. Something, however, must depend upon the distance of the field, and the abundance and regularity of the crop. Upon a review of the whole subject, it may be stated, that when turnips are grown upon the ridge-system, and at proper distances or spaces from each other, no damage need be apprehended either to the present or future crops by the drawing and the carrying of them away. There is perhaps no crop attainable within the whole range of agricultural produce which yields so valuable a portion of nutritious and wholesome food as the Swede turnip. It is useful in the field—it is valuable at home; and when the crop is divided in the manner above pointed out, it supplies the best of food in the greatest abundance for present use, and produces a plentiful supply of manure for future improvement.

Papplewick, near Nottingham.

XVI.—*On the Gestation of Cows.* By the Right Hon. Earl Spencer, President of the Society. Read May 25, 1839.

For the purpose partly of curiosity and partly because I thought the notions entertained respecting the ordinary period of gestation of cows incorrect, I several years since began to take notes, whenever a cow calved, of the length of time she had been pregnant; and, having now the periods of gestation of 764 cows taken in this way, I think a sufficient number of cases has been collected to enable me to draw general conclusions from the observations which I have made. I am certainly not aware of any practical use to which the knowledge of the results to which I am about to draw the attention of the English Agricultural Society can be applied, but, as they are connected with the physiology of cattle, and as they differ from statements made in some books of deservedly high authority on agricultural science, I think they may be considered sufficiently interesting to induce the Publication Committee to insert this Paper in the Journal.

In order the more clearly to bring under the view of the English Agricultural Society the conclusions to which my observations have led me, I shall begin by inserting a Table which will show how many cows producing live calves have gone each of the different periods therein mentioned. The first column shows the number of days of gestation; the second the number of cows

which have gone each period; the third and fourth columns show whether the produce was a cow-calf or a bull-calf; the fifth, if it was twin cow-calves; the sixth, if it was twin bull-calves; and the seventh, if it was twins of different sexes. For instance, if 279 is taken, it will appear that 32 cows went 279 days; that 16 of them produced cow-calves, 11 of them produced bull-calves, 3 of them produced twin cow-calves, none of them produced twin bull-calves, and 2 of them produced twins of different sexes.

Table.

Number of days of Gestation.	Cows.	Cow Calves	Bull Calves	Twin Cow Calves	Twin Bull Calves	Twin Cow and Bull Calves.
220	1	..	1			
226	1	1				
233	1	..	1			
234	1	..	1			
235	1	1				
239	1	1				
242	1	..	1			
245	2	2				
246	2	..	2			
248	1	1				
250	1	1				
252	2	..	2			
253	1	..	1			
254	1	1				
255	2	..	2			
257	2	1	1			
258	3	1	2			
259	1	..	1			
262	1	..	1			
263	2	..	2			
266	1	..	..	..	1	
268	2	2				
269	2	..	1	..	..	1
270	5	2	1	1	..	1
271	6	5	1			
272	3	1	1	..	1	
273	3	2	1			
274	5	..	5			
275	5	2	2	..	1	
276	15	7	6	..	1	1
277	14	10	2	1	..	1
278	18	11	4	1	..	2
279	32	16	11	3	..	2

Number of days of Gestation.	Cows.	Cow Calves	Bull Calves	Twin Cow Calves.	Twin Bull Calves.	Twin Cow and Bull Calves.
280	35	15	20			
281	39	20	18	..	..	1
282	47	26	20	1		
283	54	30	24			
284	66	33	33			
285	74	29	43	..	..	2
286	60	22	38			
287	52	25	27			
288	42	13	28	..	1	
289	45	20	25			
290	23	10	13			
291	31	9	22			
292	16	5	11			
293	10	1	9			
294	8	1	7			
295	7	3	4			
296	6	2	4			
297	2	1	1			
299	1	..	1			
304	1	1				
305	1	1				
306	3	3				
307	1	1				
313	1	1				

From the inspection of this table it will be seen that the shortest period of gestation, when a live calf was produced, was 220 days, and the longest 313 days; but I have not been able to rear any calf produced at an earlier period than 242 days. Any calf produced at an earlier period than 260 days must be considered decidedly premature; and any period of gestation exceeding 300 days must also be considered irregular; but in this latter case the health of the produce is not affected. It will also be seen that 314 cows calved before the 284th day, and 310 calved after the 285th; so that the probable period of gestation ought to be considered 284 or 285 days, and not 270, as stated in the book upon Cattle, published under the superintendence of the Society for the Diffusion of Useful Knowledge.*

* In another work, however, entitled "British Husbandry," published under the superintendence of the Society for the Diffusion of Useful Knowledge, the experiments of M. Teissier, of Paris, on the gestation of cows, are recorded to have given the following results :—

It appears also that the number of breeding females is less considerably than the number of males, and to the number of males ought generally to be added, as animals that will not breed, the females who are twins with males. I have heard and believe, that in some cases a cow-calf, twin with a bull, will breed; but in no instance in which I have bred twins of different sexes has the female been a breeding heifer. The number of breeding heifers from these 764 cows was 354; the number of bull-calves 422; and the number of heifers twin with bulls, usually called fremartins, 11.

There is a prevalent belief among farming men, and I believe farmers, that, when the time of gestation of a cow is longer than usual, the produce is generally a male calf. I must confess that I did not believe this to be the case, but this table shows that there is some foundation for the opinion. In order fairly to try this, the cows who calved before the 260th day, and those who calved after the 300th, ought to be omitted as being anomalous cases, as well as the cases in which twins were produced; and it will then appear that, from the cows whose period of gestation did not exceed 286 days, the number of cow-calves produced was 233, and the number of bull-calves 234; while, from those whose period exceeded 286 days, the number of cow-calves was only 90, while the number of bull-calves was 152.

I am not aware of any other conclusions which may be deduced from the collection of cases which I have made, and, as I have already stated, I do not see in what manner the knowledge of these conclusions can be practically useful; but any information elucidating the physiology of cattle may be advantageous in some way which at the present moment I do not foresee. I think it most probable that these results will be found generally applicable; but it must always be recollected that they are derived from the observations of one breeder only; and though I think it likely that no other man in this country has made similar observations on so large a number of individual cases, still it must be admitted that there is a possibility that, from the circumstance of my experience having been confined to one variety of cattle and to one farm, there may be found a difference in the results to be deduced from a similar experiment, if it was tried on land of different quality, in a different locality, and upon cattle of some other

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21	calved between the	240th	and	270th	day, the mean term being		$259\frac{1}{2}$
544	ditto	270th	„	299th	„	„	282
10	ditto	299th	„	321st	„	„	303

"In most cases, therefore, between 9 and 10 months may be assumed as the usual period; though, with a bull-calf, she has been generally observed to go about 41 weeks, and a few days less with a female." Vol. ii. p. 438.—F. Burke.

breed. I will therefore add, that the situation of the farm on which my cattle are bred is in the northern part of Nottinghamshire, that the soil on which they are always kept is either a light sandy soil or peaty meadows, and that they are of the Durham or improved short-horned breed.

XVII.—*On Shed-Feeding.*—By John Walbanke Childers, Esq., M.P. Read July 16th, 1839.

Having tried an experiment on the winter fattening of sheep this year, I think the insertion of it in our Journal may be desirable. It has for some time been my opinion that sheep would fatten more quickly in a yard than in the usual manner on turnips in the field. In consequence of this view of the case, I last winter enclosed a small yard with posts and rails, and erected a low thatched shed, just large enough to allow a score of sheep to lie down at once. The floor of this shed was boarded with common rough slabs, and was raised eighteen inches above the surface of the ground, the boards being placed three-eighths of an inch apart, in order to allow the free passage of water and keep the boards dry, as my great fear was that the sheep might get the foot-rot.

I then proceeded, on the 1st January, to draw forty wether hogs out of my flock of Leicesters, and divided them into two lots, as equal in quality as I could get them. On weighing each sheep separately, I found the weight of one score to be 183 st. 3 lb., and that of the other 184 st. 4 lb. I put the first lot into the yard, and placed the other lot on turnips. The field was a dry sandy soil, well sheltered, and peculiarly favourable and healthy for sheep. Each lot had exactly the same quantity of food given them, which was as follows:—

1st. As many cut turnips as they could eat, which was about 27 st. per diem for each lot.

2nd. 10 lbs. of linseed cakes, at the rate of half a pound per sheep per day.

3rd. Half a pint of barley per sheep per day.

4th. A little hay, and a constant supply of salt.

For the first three weeks both lots consumed equal portions of food, but in the fourth week there was a falling off in the consumption of the hogs in the shed of 3 st. of turnips per day, and in the ninth week there was a falling off of 2 st. more; of linseed cake there was also a falling off of 3 lbs. per day. The hogs in the field consumed the same quantity of food from first to last.

The result of the experiment is as follows:—

20 Shed Hogs.			Increase.		20 Field Hogs.		Increase.	
	st.	lbs.	st.	lbs.	st.	lbs.	st.	lbs.
January 1st	183	3			184	4		
February 1st	205	0	21	11	199	8	15	4
March 1st	215	10	10	10	208	2	8	8
April 1st	239	9	23	13	220	12	12	10
Total Increase			56	6			36	8

Consequently the sheep in the shed, though they consumed nearly one-fifth less food, made above one-third greater progress. The circumstances of the experiment were, if anything, unfavourable to the sheep in the shed: the turnips, by being stored in a house for their use, became drier than those consumed by the sheep in the field; and also in February the shed-hogs were salved or rubbed with mercurial ointment, which is generally supposed to give a check to feeding sheep.

N.B. The boarded floor was swept every day, and fresh straw was given after every shower of rain.

XVIII.—*The Detection of Pregnancy in the Mare and the Cow.* By William Youatt, Esq.

Among healthy animals, the impregnation of the female rarely fails to be the result of an intercourse between the sexes. The assurance, however, of this having taken place is, occasionally, an affair of considerable interest, and of no little difficulty; and the value and the destiny of the female may very much depend on the decision of the question. A certain time having elapsed the thing will speak for itself; but are there any symptoms or circumstances that will warrant the veterinary surgeon, or the agriculturist, in giving a decided opinion on the case in an early period of supposed pregnancy?

It occasionally happens that the fifth or the sixth month arrives, and, even to the practised eye, there are few or no indications of conception having taken place. There are, also, but somewhat unfrequently, diseases which very closely simulate this natural process. Can the veterinary surgeon or the breederdecide? The answer is in the affirmative, and plainly and unequivocally. This is one of the boons which the veterinary art can now confer on the

agriculturist. The altered character of the female is regarded, and very properly, as a circumstance of no little weight. She is comparatively calm and quiet—her appetite returns, and she regains her former condition, and her former habits. Five or six weeks pass, and there is no outbreak of any kind. The owner concludes, and he is not often wrong, that she is impregnated. He, however, has had little to do with mares or with cows who has not witnessed the return of the most furious œstrum, after a much longer period of time has elapsed. I have known more than three months pass in this delusive quietude, and then a salaciousness worse than at first has indicated that no actual impregnation had taken place. On the other hand, the œstrum, but not with all its former fury, has returned, two, and three, and four months after the connexion; and yet, as the result finally shows, impregnation had taken place at their first intercourse.

Many circumstances may cause the owner to be anxious to know the truth of the matter. He may wish to sell her, or he may be unusually desirous to breed from her. Let the animal be examined per vaginam. Let the hand be slowly and cautiously passed up the vagina until it reaches the os uteri. Let there be no attempt to penetrate farther. No information can be gained from introducing the fingers into the uterus. It is simply wished to ascertain the character of the os uteri. In its natural and unimpregnated state it will be closed; but it will not be tightly or spasmodically so, and the contraction of the mouth of the womb will form a kind of cup, with the base towards that viscus. If she is impregnated the entrance to the uterus will be more firmly closed, and the protrusion will be towards the vagina. This is the only exploration per vaginam which I would allow,—it is easily made, and it will be satisfactory. If an exploration of this kind is attempted when half or more than half of the period of pregnancy has passed, it is not at all unlikely that so much irritation of the parts will ensue as to cause the expulsion of the fœtus.

I will suppose that two months have passed since the supposed impregnation. The fœtus is still remaining in the pelvic cavity. The heart has begun to beat and the blood to circulate through its little veins. It will be situated immediately below the rectum. I introduce my hand into that intestine. I have not occasion to pass it very far up. I feel the little substance—for it then is small in proportion to its after growth. I feel it under my hand. I am certain that I am pressing upon the uterus and its contents. I cannot perhaps detect the pulsation of the embryo; but if I had delayed my examination until the fœtus was three months old, I should have assurance that it was there by its now increased bulk, while the pulsation of its heart would tell me that it was living.

For two months from this period in the cow, and for three in

the mare, I should have no other indication of the presence of the fœtus, nor of its life and growth, except from the gradual enlargement of the abdomen of the mother; and, by that time, the little one would have increased in size and strength, and would have begun to take occasional exercise in its first domicile, and then would become the more evident, but not more satisfactory proof of the life of the fœtus—its motion strong enough to be seen through the integument.

I might, perhaps, wish to give this assurance of the life of the fœtus to some curious spectator, or to some intended purchaser. I would not gallop the mare in order to effect this: I would not so far disturb her or the young animal that she bore within her. Much less would I give her cold water to drink, and which she usually would drink until she annoyed the fœtus, and the unborn animal told us how much we annoyed him by endeavouring to shift his quarters and get away from the action of the cold. I would not run the hazard of giving her the colic, and perhaps destroying him or her by this unscientific and somewhat cruel method of exploration; but I probably should give a tap or two on the outer wall of his dwelling, just sufficient to rouse him from his slumbers, and induce him to express his anger at the annoyance by a tolerably distinct plunge or kick.

Most certainly, if it was a cow that I was exhibiting, I would not give, nor would I suffer any one else to give those terrible punches in the right flank which I have no doubt are the cause of much unsuspected injury, and, occasionally at least, connected with, or the origin of, a difficult, or a fatal parturition.

I may here observe that the fœtus of the mare from the beginning occupies nearly the centre of the belly. In the early stage Mr. Mogford generally found it "lying across the pelvic cavity, the spine being immediately under—the head on the left side, and the tail on the right side." In the latter portion of its fœtal state its motions are pretty equally distributed on either side, and the beating of the fœtal heart is most plainly heard at the very base of the abdomen. The fœtus of the cow is huddled up on the right side of the belly. There its motions are most seen, and the beatings of its heart best heard. The enormous paunch, lying principally on the left side, presses every other viscus, and the uterus among the rest, into the right flank. This also explains a circumstance familiar to every breeder. If the cow should happen to carry twins they are crowded together in the left flank, and one seems absolutely to lie upon the other. Whenever the farmer notices the kicking of the fœtus high up in the flank, he at once calculates on twins.

To return from this digression. If half the period, or more, of utero-gestation had passed, and I could not get the little stranger to

move, by my gentle tapping, and it was a cow with which we had to do, and a quiet one, I would have her carefully held by the cowherd, while I stooped and applied my ear flat upon the flank, and then slowly, and with gentle pressure, upwards and downwards, and forwards and backwards, over the flank, and the lower part of it, until I heard—and which I should do in a great majority of cases—the pulsations of the fœtal heart. I should recognise it by their quickness, the pulsations of the fœtus being double or more than double those of the mother.

If it was a mare, I would have a halter put on her, and an assistant should hold up one of her legs while some person interested reached under, or, perhaps knelt under the belly of the mare, and, passing one ear along an imaginary line from between the teats to the chest, and deviating a little from one side to the other, he would there also recognise the quick pulsation of the fœtal heart.

These observations are addressed to practical men, and will be speedily put to the test by them. The object of the author is to get rid of the vulgar and inefficient methods of detecting pregnancy which are now in general use, and to introduce others that are founded on a surer and more scientific basis.

This subject is more fully treated of in the second volume of the 'Proceedings of the Veterinary Medical Association,' p. 126, and in the 12th volume of 'The Veterinarian,' p. 377.

XIX.—*On the* Orobanche *(or Broom-rape), and* Prunella vulgaris *(or Self-heal), plants injurious to Clover.* By James Main, A.L.S.

To the Secretary of the English Agricultural Society.

Sir,

I observe in the first article of your Journal, lately published, the writer, Ph. Pusey, Esq., M.P., refers to a circumstance which requires further investigation than as yet has been bestowed upon it by British farmers. I allude to what that gentleman has reported of the difficulty of raising the common broad-clover in Belgium, owing to the attack of a parasitical plant, of which two species are indigenous in Britain, and which very often deteriorate the quality and diminish the quantity of our second crops of that invaluable fodder.

These parasites are the *Orobanche major* and *O. minor,* commonly called broom-rape—meaning, perhaps, a robber of broom, from their being frequently found on waste ground growing on the

roots of the common broom, and in fields on the roots of clover. In their first appearance they resemble, in some measure, the shoots of asparagus just as they break through the ground. The stems rise from six to ten inches high, and without proper leaves, having what are called bractes instead. The flowers are arranged on the stem, like those of a hyacinth, but not so showy, being of a dingy-brown colour, succeeded by oblong capsules of seeds. A straggling individual plant is sometimes met with among ley-wheat feeding on a clover plant which has escaped destruction by the plough and harrow at wheat sowing; but it never appears again till the field is re-sown with clover.

It is not easy to account for this last-mentioned circumstance, except only by supposing that the seeds are capable of remaining unhurt in the soil for four, five, or more years, or that they are *sown with* the clover.

I have long been inclined to entertain the latter opinion, and for the following reasons: the weed always appears most plentifully on the second crop, and this crop in the south of England is that which is chosen for yielding seed. Of course, the weeds and clover are mowed, carried, thrashed and cleaned together. The seeds of both ripen about the same time, and when mixed together are not easily distinguished without a knowledge of the forms of each, and the assistance of a magnifying glass; but examined apart they are visibly different. The seeds of the broom-rape are like those of clover, only not so plump; neither so large nor so glossy, the skin being rough and of greyish colour.

In cleaning clover seed very-fine chip or wire sieves are used, but neither of these are fine enough to separate the smaller seeds of the parasite from those of clover. But sieves may be woven so fine as to separate them, without much loss of the clover-seed; and these should be ordered from the sievewright and used by the grower, and particularly by the seedsman. Both should be well acquainted with the forms of the seeds, so as to identify them at sight. Gathering and keeping a sample of the seed of the parasite is an easy matter, and which may be kept for reference.

There is another British plant which is also too frequently seen on clover leys, and which, from its casual appearance on arable land, must have been saved, and sown with the clover. It has some distant resemblance to clover in the colour of the flower, but, botanically considered, is of a very different genus—I mean the common self-heal (*Prunella vulgaris*); it flowers and ripens seeds along with the seed-clover crop, and it is more than probable that the seeds are mixed in the dressing. As, however, the seeds of the self-heal are smaller than those of clover, they may be riddled out by a properly made sieve.

As the above observations are of some importance to farmers, and particularly to seedsmen, to whom the possession of a pure stock of seed is of so much value, I have taken the liberty of laying them before you.

And, with much respect, remain,
Sir,
Your obedient Servant,
JAMES MAIN.

3, *Elm Terrace, Fulham-road,*
April 25, 1839.

Note by the Rev. W. L. Rham.

MR. VAN AELBROECK, of Ghent, in his excellent work 'On the Practical Agriculture of Flanders,' states the following experiment on the orobanche:—

"Having chosen a few perches of land, where neither clover nor orobanche had grown for 10 years previously, I had it trenched 15 inches deep, that, in case any seeds of orobanche should accidentally have been there, they might be buried beyond the reach of the roots of the clover; for, unless it meets with these, the seed of the orobanche does not germinate. I concluded that the surface-soil was perfectly cleared of the seeds of this weed.

"The next point was to clear the clover-seed to be sown of any seed of orobanche. The mode I adopted was as follows:—In the month of September of the preceding year I had procured some seed of orobanche; I mixed this with clover-seed, and then examined some of it with a microscope, *for the seed of the orobanche is too small to be distinguished in the mixture by the naked eye.* I saw that the seed of the orobanche adhered to the clover-seed by means of a glutinous substance which is on its surface. I divided the mixed seed into two equal parts, and to one of these I added a fourth part of wood-ashes. I rubbed this well in my hands in order to detach the seed of the orobanche from the clover-seed: I then threw it into a bucket of water, stirring it with my hands for some minutes, and let it settle. The orobanche-seed, *which is as light as the finest dust,* mixed with the ashes, and was gently poured off with the water. The clover-seed, which remained at the bottom, was again washed two or three times with pure water, and then poured upon a sieve, and there again washed, by pouring water over it while it was stirred with the hand. I was now persuaded that all the orobanche-seed had been washed

off, and that the clover-seed was entirely freed from it. I spread this on a cloth, and dusted it with wood-ashes to dry it, that it might be sown. It was sown the same day on a portion of the prepared ground. The clover-seed which had not been washed was sown on another portion. Now, if any orobanche appears in the first portion, said I, my mode of cleaning the seed is not effectual; but, if there is none there, and it comes up in the other portion, then my experiment is conclusive. The result fully realised my expectations: where the seed was sown, without washing, there came plenty of orobanche; where the seed had been prepared, as I have described, there was none.

"I have since repeated the experiment several times on a larger scale, and always with the same success." (L'Agriculture Pratique de la Flandre, par J. L. van Aelbroeck, Paris, 1830, p. 283.)

I am induced to give this extract from the excellent work of Mr. van Aelbroeck, not only as a valuable account of the easiest mode of getting rid of the orobanche, which is so destructive of clover, but also as a good specimen of the manner in which agricultural experiments should be conducted, and the great simplicity of the description. The venerable author, who still enjoys health and vigour at a very advanced age, devotes much of his time and attention to his farm near Ghent; and, from his long practical experience, unfettered by theory, is, on all subjects connected with the cultivation of a light sandy soil, the best authority extant.

The orobanche has never gained any great footing in England, although the seeds, adhering to foreign clover-seed, must often be imported. This may be owing to the soil and climate of England not being so favourable to its growth as those of Flanders; but the knowledge of it, and the easy mode in which the clover-seed may be purified from it, will prevent its spreading, should it ever appear.

W. L. RHAM.

August 31, 1839.

XX.—*On the Physical Properties of Soil, and on the Means of Investigating them.* By Professor SCHÜBLER, of the University of Tübingen.*

[The present paper differs from those which have come before, as belonging to the theory, not to the practice of husbandry; and attempting, therefore, to ascertain, not what are the means by the employment of which we may succeed in effecting a particular object, but what are the laws of nature under which all our operations are to be carried on. Both these branches must be followed out together, but distinctly, in order to render our science complete. Theory must not pretend to teach the occupier of land how he is to manage his farm; but so neither should the abstract inquirer, while he keeps within his own bounds, be regarded as visionary by the practical farmer. Some of the results brought out in this paper are striking, others will appear inconsiderable; yet even these last must not therefore be condemned as useless, because it is essential that, in speculating on the causes of such effects as come before us in actual husbandry, we should know not only what hidden powers of nature are operative, but also which of them are incapable of exerting any considerable influence on vegetable or animal life: just as a map points out to the sailor not only those openings of the coast which will afford him a passage, but those also which he must not enter because further progress is barred.—PH. PUSEY.]

SOILS are essentially different in their elementary nature, according to the particular earths which they contain, and the various proportions in which those earths enter into their composition; but soils possessing the very same chemical elements may be endued with widely different properties, in an agricultural point of view, according to the mechanical state of fineness or coarseness of their particles, and the degree of looseness or firmness of texture resulting from their mode of union. The investigation of these *physical properties,* as they are called, is of the highest importance in bringing us acquainted with the nature of soils and the various means within our power of modifying and improving them according to the given circumstances of the case or the intentions which the cultivator of the land has in view.

The several physical properties which may be supposed to exert a greater or less influence on the fertility of soils, and which on that account we shall more closely investigate, are the following:—

I. The weight of the soil; its specific gravity, as well as the absolute weight of a given bulk in a dry and moist state.
II. Its power of containing water, according to weight and bulk.

* This dissertation forms the Second Section of 'Agronomy,' in a German work entitled, 'Principles of Agricultural Chemistry, in more direct reference to the Economy of Agriculture and Forestry,' by Professor Schübler, of the University of Tübingen: second edition, revised and improved by Professor Krutzsch, of the 'Forest and Agricultural Academy of Tharand,' in Saxony, 1838. Translated from the German by the Secretary and Editor of the Society; who has great pleasure in acknowledging the essential obligations under which his version is laid, in its literary character as well as in its scientific points of interest, by the suggestions, revision, and friendly criticism of Philip Pusey, Esq., M.P., one of the members of the Journal Committee.

III. The firmness and consistency of a soil in its dry and in its moist state.
IV. Its different capability of becoming dry on exposure to the air.
V. Its diminution in bulk on drying.
VI. Its absorption of humidity from the atmosphere.
VII. Its absorption of oxygen from the atmosphere.
VIII. Its power of retaining heat.
IX. Its capability of becoming more or less warmed by the sun's rays.
X. Its capability of developing heat on being moistened.
XI. Its electric polarity and capability of conducting electricity.

We will now consider these several properties more narrowly, and give the process of testing soils in regard to them; to which we will subjoin a comparative arrangement of them, in reference to those earths and soils which come most frequently under the notice of the agriculturist: we have selected for this purpose,—

1. Siliceous sand.
2. Calcareous sand.
3. Finely powdered carbonate of lime, obtained from burnt limestone, which, by long exposure to the atmosphere, has returned to the state of perfect carbonate.
4. A common grey clay, consisting of 68 per cent. of silica, 36.2 of alumina, and 5.8 per cent. of protoxide of iron.
5. Stiff clay or brick-earth, loam, and sandy clay.
6. Earthy gypsum, or gypsum-powder, resulting from the pulverization of the natural white gypsum.
7. A somewhat fine-slaty, red-brown clay marl, frequently found in the Keuper formation of Würtemberg, consisting of 84.8 per cent. of clay with oxide of iron, 6.5 per cent. of carbonate of lime, 7.2 of carbonate of magnesia, and 1.3 per cent. of loosely combined oxide of iron.
8. Humus, or humic acid; and with these investigations should be connected the animal-vegetable humic acid, which is known to be of especial effect on vegetation.
9. Carbonate of magnesia, obtained from the precipitation of solutions of magnesia in acids by alkalies.
10. A fertile, light, black garden-mould, consisting of 52.4 per cent. of clay, 36.5 per cent. of siliceous sand, 1.8 per cent. of calcareous sand, 2 per cent. of lime, and 7.2 per cent. of mild humus and organic remains.
11. A common fertile arable soil, consisting of 51.1 per cent. of clay, 42.7 of siliceous sand, 0.4 of calcareous sand, 2.3 per cent. of lime, and 3.4 per cent. of mild humus and organic remains.

In testing the several properties, we employed, for comparison, white pipe-clay, as one of the purest native clays; fine lime, prepared by precipitation of acid solutions, by means of alkalies; and several other kinds of earth, of which particular mention will be made when we come to discuss the special properties of soils individually.

I. *Weight of the soil.*—In the determination of the weight of the soil, a particular distinction is to be made between the peculiar specific gravity of the several portions of earth and the absolute weight of a determinate volume, as of a cubic inch or foot of the several soils.

The specific gravity of an earth is not found by the mere weighing of a determinate volume, as, for example, of a cubic inch; and comparing such weight with that of an equal volume of water, for we should in that case always obtain too small a weight, as the interstices of every cubic inch of the earth, even when closely compressed, contain much air. The real specific gravity is obtained by the following process:—A glass bottle, with an accurately-fitted stopper, holding some 300 or 400 grains of water, is completely filled with that liquid, and the weight of the whole ascertained; now empty the bottle of half the water, and introduce into the half-filled vessel the soil to be investigated, and which had been previously weighed in its dry state; again fill up the bottle with water, and close it with the stopper as soon as it ceases after a few times shaking to give out air-bubbles from the interstices of the soil, and determine now the weight of the vessel thus filled with soil and water: the specific gravity is found from the quantity of water excluded by the soil from the bottle, by a simple calculation; and we obtain the quantity of such excluded water by subtracting the sum of the weights of the dry soil and the vessel from the weight of the vessel filled with water. An example will best elucidate the process:—

The dry soil to be investigated weighs . .	240	grains.
The vessel filled merely with water weighs	600	„
Therefore the sum of both is	840	„
The vessel filled with the soil and water together weighs	744	„
	96	„

Therefore the soil has excluded 96 grains of water from the bottle, or, in other words, 240 grains of soil require as great a space as 96 grains of water, and the weight of the water bears therefore to the weight of the soil the proportion of 96 : 240, or the specific gravity of this soil is $\frac{240}{96} = 2.50$, when we assume the weight of the water $= 1$.

The actual weight of a determinate volume of soil, which is also called its absolute weight, is obtained simply by weighing a cubic inch or a cubic foot of the soil moderately compressed in the vessel. As the weight of the soil is always very different according to its different states of moistness or dryness, it is desirable to

make this determination as well with soil fully dried at 144½° F., as also with soil thoroughly moistened; we may consider a soil thoroughly moistened when it is laid in a wet state on a filter, and no longer allows any water to drop through.

Several of the previously mentioned earths exhibited the following differences in my experiments in reference to this point:—

Kinds of Earth.	Specific Gravity, that of Water being taken as=1.	Weight of a Cubic Inch.		Weight of a Cubic Foot	
		In the Dry state.	In the Wet state.	In the Dry state.	In the Wet state.
		Grains	Grains.	Pounds.	Pounds.
Calcareous Sand	2.722	505	628	113.6	141.3
Siliceous Sand	2.653	495	605	111.3	136.1
Gypsum Powder	2.331	408	573	91.9	127.6
Sandy Clay	2.601	435	577	97.8	129.7
Loamy Clay	2.581	393	551	88.5	124.1
Stiff Clay, or Brick-Earth	2.560	357	531	80.3	119.6
Pure Grey Clay	2.533	334	515	75.2	115.8
Fine white clay (pipe clay)	2.440	213	454	47.9	102.1
Fine Carbonate of Lime	2.468	244	460	53.7	103.5
Fine Carbonate of Magnesia	2.194	75	339	15.8	76.3
Humus	1.370	154	346	34.8	81.7
Garden Mould	2.332	364	457	68.7	102.7
Arable Soil	2.401	376	529	84.5	119.1
Fine Slaty Marl	2.631	498	624	112.0	140.3

From this Table we derive the following general results:—

1. Sand, either in its dry or wet state, is the heaviest part of arable soil, certain fine slaty marls approaching the nearest to sand in this respect.

2. Calcareous and siliceous sand differ but little in this point of view, calcareous sand, however, being the heaviest of the common constituents of arable soil.

3. The clays are lighter the more clay and the less sand they contain, and the contrary.

4. The lime always exhibits a great difference in weight, according to the fineness of its particles and the mode of its preparation; that obtained from slaked lime has a remarkably less weight, even when it has become again saturated with carbonic acid, the reason of which seems to be the great expansion of quicklime on its combination with water. That employed in this experiment lay for six years spread out flat in the state of a fine powder and exposed to the air. When lime is in close combination with carbonate of magnesia, as is the case in dolomite sand, the compound of these two earths exhibits a much greater weight than either of them in its separate state; the specific gravity of such kind of sand rises to 2.82 and 2.83, and even magnesian stony marls often possess this greater weight.

5. The carbonates of magnesia, as artificially obtained by precipitation from their solutions, exhibit indeed the least absolute

weight among the usual ingredients of soil; in arable soils, however, magnesia is not found in this fine form, but usually in combination with lime or silica; in these two combinations it has a coarser form, the physical properties of which approach more nearly to those of sand.

6. Humus, among the usual constituents of soil, has the least specific gravity, and, if we except the pure artificial magnesia, it has likewise the least absolute weight.

7. Compound arable soils are generally lighter in proportion as they are richer in humus; we must not, however, conclude positively from this intimation alone as to the fertility of a soil, since the humus itself is liable to great differences, and even the other pure earths exhibit, according to the fineness of their particles, great diversity in weight, and consequently mixed earths may acquire very different average weights; a more certain evidence on this point is furnished by the specific gravity than by the absolute weight.

8. The usual denomination given by the farmer of heavy or light soils, refers neither to the specific gravity nor to the absolute weight of the earth; clay soils, in their dry as well as in their wet state, are of less weight than sandy soils; these designations, therefore, of heavy and light, refer much more to the different consistence of the earths, of which we shall say more subsequently.

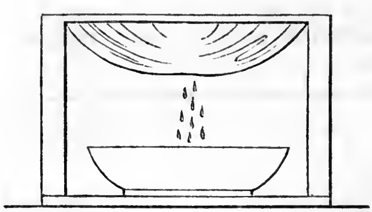
Weight of artificial mixtures of earths.—When different earths are artificially mixed together, a cubic inch of the earthy mixture obtained gives a weight greater than the arithmetical mean (or common average) of the earths entering into the mixture, whether mixed in equal portions according to weight or volume, or in other quantities. I took, in different proportions, a common siliceous sand, a rich clay, and a fine clay-marl, of which I had previously ascertained the absolute weights, and mixed them together, when I determined the weight of the mixture. I obtained the following results:—

Kinds of Earth.	Weight of 5.7 Cubic Inch.	Arithmetical Mean.	Increase of Weight.
	Grains.	Grains.	Grains.
Common Siliceous Sand	2840		
Stiff Clay or Brick Earth	2020		
Fine Clay-marl	1790		
Clay and Sand in equal proportions by weight	2545	2430	115
Clay and Sand in equal proportions by volume	2685	2430	255
2 parts Clay and 1 part Sand by weight . .	2390	2293	97
2 parts Clay and 1 part Sand by volume . .	2470	2293	177
2 parts Sand and 1 part Clay by weight . .	2740	2566	174
2 parts Sand and 1 part Clay by volume . .	2825	2566	259
Equal parts of Marl and Sand by weight . .	2315	2267	48

This phenomenon is only to be explained by supposing a more intimate approach in the interstices of the contiguous earthy particles; something similar, therefore, seems here to happen with this mechanical commixture, to what takes place in a still higher degree with natural mixtures of earthy and rocky materials, for instance, with the dolomite sand and stony marls already mentioned, in which cases not only the absolute weight, but the real specific gravity also is greater than in the separate earths.

II. *Power of soil to contain water.*—We understand by the power of the earths to hold or contain water, their property of receiving and retaining more or less water within their interstices, without allowing it again to flow away by dropping: it is of the greater importance to vegetation, as on it depends the quantity of the means of aqueous nourishment the soil is in a condition to receive and supply to the roots of plants, and as the water itself is likewise one of the most essential sources of nutriment to plants.

The power of an earth to contain water may be found in the following manner: we take 400 grains of the earth to be investigated, and dry it at a temperature of about 144½° F., until it ceases to lose weight; in order to obtain results that may be compared easily together, it is desirable that the experiment be made with nearly equal quantities of each earth in its fine state, say, with about 400 grains or one cubic inch, because, when a large quantity is employed, the weight alone of the earth occasions the pressure of a greater quantity of water out of it, and we should in such cases obtain different results for the same earth. We put this dried earth on a round filter consisting of unsized paper, and which has been previously weighed in its thoroughly moistened state, and laid in a glass funnel, or on linen stretched over a frame (as in the following figure).



The latter mode is preferable, as the water poured on can more easily flow off, and it also allows the wet filtering paper to be raised up more easily and removed without tearing. We now pour over the earth lying on the filter distilled or rain-water, until it is fully moistened and saturated; and when it has ceased dropping, we bring it, while remaining in this wet state, on the filter, to the balance, to ascertain the weight of the whole; and then, by

a simple calculation, determine the quantity of water absorbed, and power per cent. which the earth exhibits of containing water:—

Let the weight of the dry earth be . . .	400	grains.
The weight of the wet filter	110	„
Sum of the two . . .	510	„
The weight of the earth saturated with water, and the filter	706	„
Therefore the amount of water absorbed is .	196	„

As 400 grains of this earth absorbed 196 grains of water, 100 grains of the same would retain 49, and the power of this earth to contain water would therefore be expressed by 49.

Should the earth on the filter absorb the moisture with difficulty, and receive it unequally into its interstices, it would be better to mix it in its dry and previously-weighed state with water in a glass vessel, and then pass it by degrees from this vessel to the filter.

When an earth contains much humus and salts of humic acid, it may be best to omit drying it before it is placed on the filter, as the humic acid has the property of taking up less water after it has been once thoroughly dried. In such a case the drying may be made the last stage of the process. But, in earths which contain only a small per centage of humus, as is the case with most arable soils, the power of containing water can be only very slightly affected by that circumstance; and by drying them in the first instance, we in fact obtain a far more decisive result, since it is thus only that we can be sure we have taken them in equal quantities. Clayey soils, too, absorb a different quantity of water, according as they have been submitted in their half-moistened state to a different pressure and different treatment—differences which can only be obviated by previous drying and pulverization.

In an agricultural point of view, it is also of importance to know how much water a given bulk as well as weight of soil can take up, in order to be enabled to form a more correct judgment of the quantity which any given space of ground can absorb. This question is in every case easily answered when we know (by the method already explained) the determinate power of containing water by weight, and the weight itself also of a given bulk of soil in its wet state.* If we have found the power of containing water of siliceous sand equal to 25 per cent. and the weight

* It might appear, that this determination could be made by the mere comparison of the weights of a cubic inch of dry and wet soil, or from the absolute weight of a volume of the dry soil, and its power of containing water; we should, however, in this way obtain no correct result, because many soils, especially those containing clay and humus abundantly, contract considerably in drying, a cubic inch of such dry soils generally occupying a greater space in their wet state.

of a cubic inch of the same in its wet state 605 grains; since 100 grains of this sand absorb 25 parts, the 605 grains, which form the cubic inch, will in like manner absorb 121 grains.

The following Table contains the results of the experiments which I made, in reference to this branch of the subject, with such soils as usually come under the notice of the agriculturist. I add, at the same time, to the list of these soils, the finely prepared carbonate of lime, obtained by precipitation from solutions in acids, and also pipe-clay, as representing one of the purest and finest of the clays:—

Kinds of Earth.	Power of containing water.		A cubic inch contains in the wet state		A cubic foot of the wet earth contains of water
	According to weight.	According to volume.	Grains of water.	Cubic lines of water.	
	Per cent.	Per cent.			Pounds.
Siliceous sand	25	37.9	121	655	27.3
Calcareous sand	29	44.1	141	763	31.8
Gypsum powder	27	38.2	122	660	27.4
Lime, precipitated	47	54.5	174	941	39.1
Fine lime	85	66.1	211	1142	47.5
Fine magnesia	256	76.1	242	1316	62.6
Sandy clay	40	51.4	164	888	38.8
Loamy clay	50	57.3	183	991	41.4
Stiff clay, or brick earth	61	62.9	201	1088	45.4
Pure grey clay	70	66.2	212	1145	48.3
White clay, pipe-clay	87	66.0	211	1142	47.4
Humus	181	69.8	223	1207	50.1
Garden-mould	89	67.3	215	1164	48.4
Arable soil	52	57.3	181	980	40.8
Slaty marl	34	49.9	158	863	35.6

From this Table we obtain the following general results:—

1. The sands have the smallest power of containing water, whether they are compared in weight or in volume with the other earths: siliceous sand has the least power of them all; the sands themselves, moreover, differ according to the different fineness of their grains; with large-grained sand the power becomes diminished down to 20 per cent., while it amounts to 40 per cent. when the particles are exceedingly fine.

2. Gypsum powder very nearly approaches the sands in this respect, and possesses even a somewhat smaller power of containing water than calcareous sand.

3. Slaty marl, notwithstanding the great proportion of clay it has already been remarked to contain, exhibits only a small power of containing water, and in this respect most nearly resembles sand of all the usual constituents of soil; and having this quality, it must be particularly calculated to render the soil both warmer and dryer: these kinds of marl are accordingly frequently applied in the south-west parts of Germany to the improvement of vineyards.

4. Carbonate of lime exhibits great differences in its power of containing water, according to the fineness of its particles; it is therefore important, in investigations of soil, to make a distinction between the fine lime separated by decantation, and the earthy lime as found in the form of sand in an arable land.

5. Carbonate of magnesia, as found in arable soils, is not usually in so fine a form as that artificially prepared for, and used in, these experiments, but exists in a coarse-grained state in combination with lime or siliceous earth: when so combined, it possesses in a far less degree the power of containing water, and approaches in this respect to the character of the sands.

6. Humus has usually the greatest power of containing water of all the common ingredients of soil, and in a still higher degree is this the case when the humic acid has not been previously dried artificially, or when it is still mixed with a large proportion of half-decomposed organic matters, remains of wood, leaves, roots, &c.: 100 parts of the fine earth formed by decaying wood in old trees are capable of absorbing into their interstices nearly 200 and certain light turf-earths from 300 to 360 parts of water, even when they have been previously dried artificially; where we meet with a great water-holding power, one, namely, which exceeds 90, we may reckon with great probability on an abundant commixture of organic matter.*

III. *Firmness and consistency of soil.*—The firmness and consistency of soils is of considerable importance, in regard both to the fertility and to the working of land; the terms universally adopted in husbandry, of a heavy or a light soil, rest on these properties, and therefore deserve inquiry, with regard as well to the dry as to the moist state of the earth.

(*a.*) *Firmness and consistency of a soil in its dry state.*—The determination of the consistence of a soil is one of the more difficult problems, which in physical investigations of the earths ought the less to be neglected, since we can never hope to ascertain it by a mere chemical process. Professor Völker proposed for this purpose, some time ago, a rather complex instrument,† of which the principal part is a kind of spade, the pressure and resistance of which on the field itself is determined by weight; this method cannot, however, be applied in comparative experiments of the consistence of individual soils, on a small scale.

Dr. Meyer (in his determination of the consistence of sandy soils) applies, with this view, a plate of four square inches in

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* On this property of soils see further Note A, p. 213.

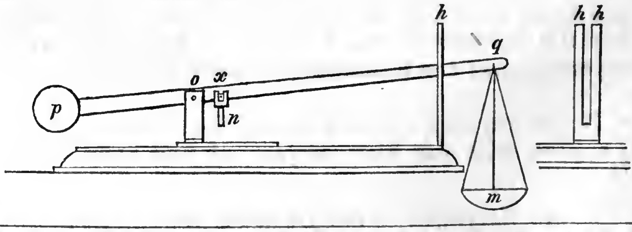
† In the new 'Mögelin Annals of Agriculture,' vol. iv, p. 119, with a plate.

size,* furnished at its four corners with steel points rounded off below, and placed on a layer of soil three inches deep; the weights placed on the plate, which are required in order to force it into the soil, serve as the measure of this consistence: in the case, however, of stiff soils in a dry state, this method is attended with the inconvenience and difficulty of requiring very great weights to be laid upon the plate: with pure clay even 30 pounds are not sufficient for the purpose; while, in the case of very loose earth, the plate sinks too easily. In order to obviate these difficulties, Meyer proposes to submit the earths to this trial with an equal measure (5 per cent.) of water in each—a modification, however, which, in the execution of comparative experiments, has many difficulties.

Among the various methods which I have myself tried, I believe the following may be recommended as the most practicable in the generality of cases, and as applicable not only to the purpose of ascertaining the consistence of mixed earths, but also that of the clays, and even of very strong mortars.

We take the earths we wish to compare in a moderately and uniformly moistened state, and having prepared an open mould or socket of wood (or better of metal), open at the top and bottom, we form oblong square-cornered pieces (or little bricks)

one-third of an inch in breadth and thickness, and about two inches long; we either leave these in the mould to dry of themselves, or remove them from it while in their fresh damp state (by the contrary pressure of a piece of wood of equal size and form); we then allow this moulded earth to dry first in the air and shade, and afterwards to become perfectly dried at a higher temperature of about 144½° F. The different degrees of firmness of the dried earths may now be more easily ascertained by the following simple instrument:—



* See the sketch of this in the 'Flora of the Kingdom of Hanover,' p. 307, Göttingen, 1822.

p q is a scale-beam 20 inches in length, *p* being a ball of lead, by means of which the scale-pan *m* on the longer arm is kept evenly balanced, so long as weights are not put into it; this arm of the balance has its movement within a fork-like section made through the upright piece *h*, of which the fig. *h h* is the front view: *n* is of steel, blunt, spade-shaped in its termination, the 36th part of an inch in thickness, and one-third of an inch in breadth below (as corresponding with the breadth of the rectangular piece of moulded earth, to be submitted to trial); this little spade is secured to the beam at *x*, by a pivot, in such a manner that it always hangs freely straight down. The earth to be examined is now brought under the little spade, weights are put into the scale-pan until the earth is cut through; in the case of earths whose consistency is small, we must commence with dram weights only; with earths of great firmness, the weight required will amount to several pounds; if we give to the beam, from *o* to *q*, a length of 12 inches, while the pivot-point of the little spade *x* is at the distance of one inch from *o*, the weight of a single pound put into the scale-pan will exert on the earth a pressure equal to the weight of 12 pounds; if we repeat the experiment several times, which we can easily do, with the rectangular moulded pieces of the same earth, and take the average of the whole, we shall obtain a result much nearer to the truth. The purest, densest, and heaviest clays to work, which I had occasion to examine by means of this instrument, required, in order to crush them, 4½ pounds in the scale—consequently, an actual pressure equal to 54 pounds.

If we designate the consistence found for the compactest clay by the number 100, the consistence of all the other earths may easily be referred to this as the standard; and thus, independently of the clay itself, we shall be able to institute comparisons between the consistencies of any of the different earths. The principal point is, to form properly and equally worked pieces of the earths to be compared, without too much water; and this, with a little practice, may easily be accomplished by means of the mould already mentioned.

The tabular view given at the termination of the following paragraph, contains the consistencies obtained, according to this plan, of the simple soils most frequently employed in husbandry; a comparative investigation of the firmness of the different kinds of mortar by means of the same instrument, was communicated by me some years ago in an appendix to Alberti's 'Description of the Mountains of Würtemberg' (Stuttgart, 1826, p. 305), which also appeared in an abstracted form in Schweigger's 'Journal of Chemistry,' in 1827; only, with this difference, that in those experiments, I made *n* terminate in a steel point, instead of a short spade.

(*b.*) *Consistence of soil in the moist state, and its attachment or adhesion to agricultural implements.*—When land is worked in a wet state, we have not only to overcome the cohesiveness of the particles among themselves, but at the same time their attachment and adhesion also to the agricultural implements employed. If we wish to subject this property to a comparative trial, we may effect it in the following manner. We fasten large round plates, equal in size, made of iron and wood (as the two materials commonly used for agricultural implements), underneath the scale-pan of a balance, and put weights into the other scale until both are equally balanced; we now bring the plate into exact contact with a moistened earth lying beneath it, and put weights into the other scale-pan until the plate is drawn away from the earth; the amount of such weights corresponds to the degree of adhesion, or to the difficulty of working the earth in its wet state; the degree of this adhesion is often more considerable than would have been expected—an adhesion plate of three or four square inches required upwards of two ounces of counter-weight in order to draw it away from the surface of garden-mould: in the case of the heavier clays, the weight required was as much as five or six ounces. From the size of the plate employed in this experiment, it is of course easy to calculate the amount of adhesion for larger or smaller surfaces.

The following table contains the results derived from experiments made according to the foregoing plans, on the firmness and consistence of earths; the amount of adhesion in the wet state is calculated in pounds on a surface of one square foot.

Kinds of Earth.	In the Dry State.	In the Wet State.	
	Firmness, that of Clay being 100.	Adhesion to Agricultural Implements, on a surface of 1 Square foot; with	
		Iron.	Wood.
Siliceous Sand . . .	0	3.8 pounds	4.3 pounds
Calcareous Sand . . .	0	4.1 ,,	4.4 ,,
Fine Lime	5·0	14.3 ,,	15.6 ,,
Gypsum Powder . . .	7.3	10.7 ,,	11.8 ,
Humus	8.7	8.8 ,,	9.4 ,,
Magnesia	11.5	5.8 ,,	7.1 ,,
Sandy Clay	57.3	7.9 ,,	8.9 ,,
Loamy Clay	68·8	10.6 ,,	11.4 ,,
Stiff Clay or Brick-earth .	83.3	17.2 ,,	18.9 ,,
Grey pure Clay . . .	100.0	27.0 ,,	29.2 ,,
Garden-mould . . .	7.6	6.4 ,,	7.5 ,,
Arable Soil	33.0	5.8 ,,	6.4 ,,
Slaty Marl	23.0	4.9 ,,	5.5 ,,

(*c.*) *General results from these experiments.*—1. If we compare the different consistency of the earths with their different

weight previously given, we shall feel satisfied that the customary terms employed by the farmer of a heavy or a light soil are founded on this cohesion of the soil within itself, and adhesion to agricultural implements, and therefore rather indicate its property of being easier or lighter to work than its weight; the more or less easy penetration of the roots into the surrounding soil will probably be in the same proportion.

2. The consistency and firmness of soils in the dry and in the wet state increase in much the same rate; clay-lands, whether in the dry or wet state, are the most difficult to work, the sandy soils and those containing much humus being the most easy; when we have ascertained the consistence of a soil in its dry state, we shall be able to conclude with much probability respecting its consistence in its wet state.

3. The firmness and consistency of a soil are not in the direct degree of its power of containing water; individual earths, as fine lime and magnesia, and humus, notwithstanding their great power of containing water, possess but little consistency; we cannot, therefore, infer the one property from the other.

4. The consistency is generally the greatest in clayey soils; this, however, is not always the case, as the clays themselves exhibit great differences according to the fineness or coarseness of their grain; fine slaty marl, notwithstanding its great proportion of clay, indicates only a slight consistence; even pipe-clay, although belonging to the purest of the fine kinds of clay, has a far smaller consistence than the ordinary clay of arable soils; I found its consistence in the dry state, from the mean of several experiments, only 42, and therefore not half so great as that of the heavy grey clay of arable soils.

5. Light soils, such as the sandy, gain much cohesive power by moisture; even the purest sand, which in its dry state loses all its coherence and falls into a shapeless powder, regains a certain degree of cohesiveness on being again wetted; a damp climate, therefore, with a large average quantity of rain, will be found, under similar circumstances, more advantageous to sandy districts.

6. In the case of all the earths, the adhesion to a surface of wood is seen to be greater than to one of iron, a circumstance occasioned, without doubt, by wood, even in its finished state, presenting more points of contact than iron to the damp earth; this might appear to be contradicted, by land in wet weather being often more capable of being worked with wooden than with iron implements, such for instance as harrows; the reason of this, however, is to be sought, not in the smaller adhesion of the soil to the wood, but frequently in the circumstance of iron implements, from their greater weight, sinking deeper into the soil in wet weather than wooden ones.

Diminution of the consistency of soil by the penetration of frost.—When soil in its wet state is exposed to the effects of cold in winter, so as to be thoroughly frozen, this circumstance is found to exercise a considerable influence on its consistency; on being completely dried after this exposure, and submitted to the examination already mentioned for the trial of consistence, the degree of that consistence will be found considerably diminished; this is more particularly the case with clays and soils of great consistence: their firmness becomes diminished nearly one-half by exposure to frost: with loamy clay the consistence is reduced from 69 to 45 of the scale previously employed, with an ordinary arable soil from 33 to 20. The presence of moisture is essential for the production of this effect, as completely dry earths suffer no change by frost. This phenomenon is to be explained by the crystallization of the water in the interstices of the soil, occasioned by freezing, in consequence of which, the several particles of earth become forced from their position, and their points of contact are thus rendered fewer in number.

The beneficial influence of breaking up the earth before winter sets in, in order to make it more easy for the frost to penetrate the broken clods, depends on this diminution of consistency occasioned by the frost: but if a soil that has thus been rendered lighter by frost is worked in too wet a state in the early part of the spring, the beneficial loosening which had taken place is again lost, since by such working the earthy particles are once more brought into intimate contact: this is the reason why it is of such lasting injury for a soil to be worked while the weather is too wet. The throwing-out, as it is called, of many plants from the ground in changeable winters, when but little snow falls, as so often occurs, in consequence of alternate freezing and thawing, receives its explanation also in this enlargement of bulk occasioned by the frost in the soil—the smaller plants being thus gradually raised up out of the soil, and their upper roots in consequence very often wholly laid bare of earth, and the whole plant on that account destroyed; plants having the advantages of stronger and more deeply penetrating roots, are consequently far less exposed to be thrown out by frost.

IV. *Capability of soils to become more or less speedily dry, or their power of retaining water.*—It is a question of considerable importance in vegetation, whether a soil gives up its acquired moisture again to the atmospheric air quickly, or retains possession of it for a long time in its pores. By the following process, this property may be subjected to a comparative examination. We place on a round surface of tin plate, having a raised border, a given quantity of the earth to be examined; having previously saturated this fully with water, we spread it out evenly, and

ascertain the weight of the whole; we suffer it to remain for several hours in a closed room to evaporate, and again weigh it to ascertain the quantity of water evaporated during the time; if we make the experiment with many earths at once, we shall be able to institute a comparison among them with the greatest certainty in reference to this point. To obtain accurately the quantity of water contained in the earth at the commencement of the experiment, we afterwards dry it perfectly in an artificial heat, and thus easily reduce the quantity of evaporated water to hundredth parts of that contained in the earth.

	Grains.
Let the weight of a wet earth be	310
The weight of the same earth after 24 hours	260
The weight of the perfectly dried earth	200
Therefore the amount of water evaporated in 24 hours will be	50
And the water in the earth at the beginning of the experiment	110

Since, in this case, 50 of the 110 parts of the water taken up have evaporated, the amount of water vaporized from 100 parts will be 45.5 parts. The following table contains the results of the experiments which I obtained, in reference to this point, with 200 grains of the several earths at a temperature of $65\frac{3}{4}°$: they were spread out over a surface of ten square inches. The second column of the table contains in one view the portions of time in which the several earths respectively became dry under exposure to the same temperature; I did not require a perfect state of dryness, as this, at a temperature of $65\frac{3}{4}°$ F. and in the open air, could not be expected.

Kinds of Earth.	Capability of drying.		
	Evaporation from 100 parts of absorbed water, at $65\frac{3}{4}°$ F. in 4 hours.	Times required for 90 parts of water to evaporate (at $65\frac{3}{4}°$ F.) from 100 parts absorbed.	
	Parts.	Hours.	Minutes.
Siliceous sand	88.4	4	4
Calcareous sand . . .	75.9	4	44
Gypsum powder . . .	71.7	5	1
Sandy clay	52.0	6	55
Loamy clay	45.7	7	52
Stiff clay, or brick earth . .	34.9	10	19
Pure grey clay . . .	31.9	11	17
Fine lime	28.0	12	51
Humus	20.5	17	33
Magnesia	10.8	33	20
Garden-mould	24.3	14	49
Arable soil	32.0	11	15
Slaty marl	68.0	5	53

General remarks on this property, with further experiments on the same subject. Hence we obtain the following deductions:—

1. The terms of a hot or cold, a dry or wet soil, rest chiefly on this property of earths: sand, gypsum, and slaty marl, of all the earths, are the quickest in becoming dry again; on that account they form what are called the hot soils.

2. The carbonate of lime exhibits great differences in this respect, according to the different form in which it occurs in soils. Calcareous sand dries up very quickly, while fine carbonate of lime yields the moisture it contains far more slowly to the air; the latter has, however, independently of its chemical action on humus, the important advantage over clay of loosening the soil after it is dried.

3. This property of the earths to require a longer or shorter time to become dry, might seem to stand in the same relation as their power of containing water; and with thin layers this is nearly always the case: but with layers of some inches in depth, the proportion deviates considerably, the deeper layers in this case drying more slowly, according to their degree of consistency, and to their greater or less contraction on drying: clay soils with a large proportion of clay exhibit this variation in an especially striking manner.

In order to convince myself more accurately, by positive experiments, of this slower process of evaporation in the case of deeper soils, I placed ten earths of very different power of containing water in round tin vessels, equal in size, 1 inch in depth and $1\frac{3}{4}$ in diameter—allowing them, after previous saturation with water, to become gradually dry, in a closed room whose temperature varied from $65\frac{3}{4}°$ to $72\frac{1}{2}°$ F.; I determined their weight at the commencement of the experiment, after thirty-six hours, and at the end of four days. They gave off their moisture to the air, at first, according to that relation of their power of retaining water which had already been shown by the experiments with shallow layers; as soon, however, as their upper surface had become in some measure dry, and they were contracted into a more or less diminished space, this result varied in the following different degrees; for easier comparison, the power of containing water possessed by the earths employed in these experiments is here also annexed:

Kinds of Earth.	Water evaporated in 4 days.	Power of containing water of the earths.
	Grains.	Per cent.
Calcareous sand	146	29
Light garden-mould	143	89
Gypsum powder	136	27
Very light turf-soil	132	366
Slaty marl	131	34
Arable soil	131	60
Fine magnesia	129	256
Black turf-soil, not so light . .	128	179
White fine clay	123	70
Grey fine clay	123	87

Whence follows, that the different degree of looseness or consistency of the ground has a considerable influence on the more or less easy drying of deep soils; the garden-mould employed in these experiments, notwithstanding its great power of containing water, in which it stands near to pure clay, gave off again to the air far more moisture in the same time than the clays; likewise the turf-soils and magnesia, notwithstanding their great power of containing water, became dry again at a quicker rate than the clays; the fine grey clay, after fourteen days, exhibited in these experiments still a damp surface, while the surfaces of the turf-soils and magnesia became perfectly dry many days earlier: since the consistency of a soil, and its tendency to become contracted into a narrower space, exerts so great an influence on the drying of a stratum only one inch deep, this must, of course, be the case in a far higher degree with beds of soil having a depth of several inches.

V. *Diminution of bulk on drying.*—The greater number of soils become contracted into a narrower space on drying; and in consequence of this circumstance, cracks and fissures frequently occur in land, and have an injurious effect on the vegetation, as the finer roots, which often ramify horizontally, and not unfrequently supply to the plants the greater part of their means of nourishment, are, by such contractions, either laid bare of soil or torn asunder. In order to subject soils to comparative experiments on this point, the following plan may be adopted: we either form of the earths, in their wet state, large cubic pieces of equal size, being at least ten lines (or ten-twelfths of an inch) in height, breadth, and length, and therefore 1000 cubic lines (or a little more than half a cubic inch) in content, or we let such earths be fitted and dried, one after the other, in an accurately-worked cubic inch; after some time, when the weight of these cubes of earth ceases to change by

further drying, we measure the dimensions of the cube by means of a rule on which the tenths of lines can be distinguished, and may thus calculate easily the volume of the earth, and consequently find the diminution in bulk which has been caused by the drying.

The experiments I made with the simpler earths, exhibited on this point the following differences:—

Kinds of Earth.	1000 cubic lines became diminished in volume to	1000 parts therefore diminished in volume by
Siliceous sand	(no change)	..
Calcareous sand		
Fine lime	950 cubic lines	50 parts
Sandy clay	940 ,,	60 ,,
Loamy clay	911 ,,	89 ,,
Stiff clay, or brick earth . . .	886 ,,	114 ,,
Grey pure clay	817 ,,	183 ,,
Carbonate of magnesia . . .	846 ,,	154 ,,
Humus	800 ,,	200 ,,
Garden-mould	851 ,,	149 ,,
Arable soil	880 ,,	120 ,,
Slaty marl	965 ,,	35 ,,

General remarks.—1. Gypsum, in this respect, is seen to be very similar to the sands, and diminishes its volume in a very inconsiderable degree.

2. Fine carbonate of lime, notwithstanding its great power of containing water, gives on drying only a very small diminution of bulk, not by any means so great as that of clay; this property of the earths does not stand, therefore, in the same proportion with their power of containing water, and in as little with the firmness and consistency of the soil; humus, notwithstanding its little consistency, exhibits on drying a remarkable degree of contraction.

3. Among those earths which are free from humus, clay is the one which gives the greatest diminution of bulk on drying; an addition, however, of sand, or of carbonate of lime, diminishes this property considerably.

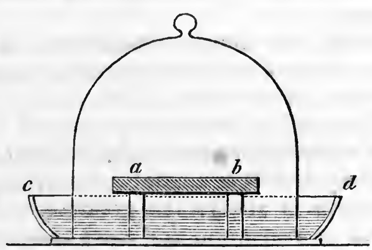
4. The tendency of many kinds of marl to fall into numerous small pieces on drying may be explained from this great difference which clay and lime, the elements of marl, experience in their diminution of bulk on drying after having been moistened; these individual parts changing their volume in a different degree, and thus occasioning a more easy disintegration of the natural compound we call marl.

5. Humus, of all the usual ingredients of soil, experiences on

drying the greatest diminution of bulk, contracting one-fifth of its volume on being dried, and again expanding in the same proportion when moistened with water; this explains the reason why the upper surface of the earth in damp turf bottoms, containing much humus, frequently rises or sinks several inches accordingly as the soil is penetrated with more or less water, and why this elevation of wet turf-soils becomes still more remarkable, when a sharp frost sets in after wet weather, the freezing, by its expansion, still further increasing the volume of the particles of water which had previously penetrated the turf; hence, too, the reason why these turf-bottoms have in their wet state a remarkable elasticity if heavily trodden upon, and often occasion, in consequence of that yielding property, the feeling of fluctuation.

VI. *Property of the earths to absorb moisture from the atmosphere.*—Most of the earths which are commonly found in soils have the property in their dry state of absorbing moisture from the atmosphere, and this circumstance has a considerable influence on their different degrees of fertility.

The amount of this absorption may be found, by spreading a given quantity of the fine and previously well-dried earth on a plate, and placing it under a glass receiver, having its inverted mouth closed underneath by immersion in water:—



a b is the earth lying on the plate, which rests on a stand; *c d* is the vessel below, containing the water into which the receiver is inverted and thus closed from the external atmosphere. We allow the earths to remain under this receiver the same time respectively —12, 24, or 48 hours—in a mean temperature, varying from 59° to 65¾° F. and then weigh them again; the increase of weight corresponds to the quantity of water absorbed. The following Table exhibits a statement of the results I obtained, in reference to this inquiry, with the usual earths; the whole of the experiments were made in a temperature which varied between 59° and 65¾° F., and the amount of absorption is given in grains:—

Kinds of Earth.	1000 grains of Earth on a surface of 50 square inches, absorbed in—			
	12 Hours.	24 Hours.	48 Hours.	72 Hours.
	grains.	grains.	grains.	grains.
Siliceous sand .	0	0	0	0
Calcareous sand	2	3	3	3
Gypsum powder	1	1	1	1
Sandy Clay . .	21	26	28	28
Loamy Clay . .	25	30	34	35
Stiff Clay . .	30	36	40	41
Grey pure clay .	37	42	48	49
Fine lime . .	26	31	35	35
Fine magnesia .	69	76	80	82
Humus . . .	80	97	110	120
Garden-mould .	35	45	50	52
Arable soil . .	16	22	23	23
Slaty marl . .	24	29	32	33

General remarks.—1. Excepting the siliceous sand, all kinds of soil have the property of absorbing moisture from the atmosphere; the slaty marl, which, in regard to consistency and power of containing water more nearly approaches the sand, distinguishes itself more favourably than them in this respect; the absorption is seen to be generally the strongest in the clay-soils, especially when they contain humus.

2. Humus, of all the simpler constituents of soil, shows the greatest power of absorption: in this respect, however, the kinds of humus themselves furnish marked differences; the pure vegetable dried humic acid simply obtained from turf, in extended experiments made by myself, absorbed moisture from the air far less easily than that prepared from animal manure.

3. The absorption is always the greatest at first; the earths always absorb less in proportion the more they gradually become saturated with moisture, and they generally attain that point after a few days; if exposed to the sun-light, a portion of the absorbed moisture becomes again vaporized; in nature, a daily periodical change in this respect appears to take place, which must have a beneficial effect upon vegetation: the earths absorb moisture at night which they partially give off again during the course of the day.

4. Fertile arable soils generally possess a great capability of absorption; still we must not conclude at once from the power of absorption alone which a soil may manifest, as to its fertility, since even clay soils without any humus absorb considerable moisture from the air; in the above experiments the pure sterile clay ab-

sorbed, in 12 hours, 37 grains of moisture, and consequently more than a very fertile garden-mould, which in the same time had absorbed only 35 grains. The assumption of Davy,* that this capacity of absorption possessed by a soil was to be received as a conclusive proof of its fertility, is liable, therefore, to many exceptions: and, if applied without modification, might easily mislead.

VII. *Property of earths to absorb oxygen gas from the atmosphere.*—The earths possess the remarkable property of absorbing oxygen gas from the atmospheric air, a phenomenon pointed out many years ago by Alexander von Humboldt; † this fact has indeed been subsequently called in question by some philosophers, but a more recent and extensive series of observations which I have myself made on this subject, and communicated in the eighth volume, pages 141, &c., of the new series of Schweigger's 'Journal of Chemistry,' shows that this property of the earths is confirmed almost without an exception, provided they be employed for this purpose in a moist state; the capability, therefore, of the earths to absorb moisture from the atmosphere appears to be of great importance, in dry seasons, as a preparation for this further process of absorbing oxygen, which we have now to examine.

In order to examine this property, introduce determinate quantities of the several earths, about 200 grains of each, in their moistened state into glass vessels (flasks) of equal size, and containing each about three or four cubic-inches of atmospheric air; make them air-tight by means of stoppers, surrounded at the edge with resinous cement; and, after several days have elapsed, test this included air for the quantity of oxygen it may contain by means of an accurate eudiometer, and thus ascertain the amount of oxygen gas absorbed, by the diminution which is found to have resulted in the proportion of that gas contained in the remaining air. The following table contains the results I obtained from my experiments on this point with the several earths; the experiments were made in glass vessels of 15 cubic-inches' contents, and with 1000 grains, in each case, of the several earths in a moderately moistened state, and in a temperature varying from 59° to $65\frac{3}{4}$° F.; excepting in the case of magnesia, of which, on account of its levity, only half that quantity was taken; the air remaining was afterwards analyzed by the voltaic eudiometer, and from the volume of the air absorbed its quantity was calculated by weight; for the sake of comparison, other earths of the same kind were likewise exposed in a state of perfect dryness.

* Davy's 'Agricultural Chemistry,' 4to. 1813, pages 159, 160.
† Gilbert's 'Annals of Philosophy,' vol. i. p. 512.

Kinds of Earth.	Absorbed in the dry state.	In the wet state. Absorption in 30 days, by 1000 grains of Earth, from 15 Cubic Inches of Atmospheric Air containing 21 per cent. of Oxygen.		
		Per cent.	Cubic inches.	Grains.
Siliceous sand . . .	0	1.6	0.24	0.10
Calcareous sand . .	0	5.6	0.84	0.35
Gypsum powder . .	0	2.7	0.40	0.17
Sandy clay	0	9.3	1.39	0.59
Loamy clay . . .	0	11.0	1.65	0.70
Stiff clay, or brick-earth	0	13.6	2.04	0.86
Grey pure clay . .	0	15.3	2.29	0.97
Fine Lime	0	10.8	1.62	0.69
Magnesia	0	17.0	2.66	1.08
Humus	0	20.3	3.04	1.29
Garden-mould . . .	0	18.0	2.60	1.10
Arable soil . . .	0	16.2	2.43	1.03
Slaty Marl	0	11.0	1.65	0.70

General remarks, with further experiments on this property.—All the earths lose on drying the property of absorbing oxygen from the air, but regain it in the same proportions as before on being moistened; if covered about a quarter of an inch deep with water in the closed vessel, the absorption takes place in the same manner; water alone, however, in the same quantity, and in the same vessels, absorbs only a very small portion per cent. in the same time, a clear proof that it is the earths themselves which induce this process in a different proportion.

2. Humus, of all the ordinary earths, exhibits the greatest degree of absorption of oxygen; the clays approach nearly to it; sand shows the least; fertile earths rich in humus absorb in general more than others which are poorer in humus and clay; the included air standing over them becomes at last so poor in oxygen that lights would become extinguished, and animals die in it.

3. In the mode of absorption, there is an essential difference between humus and the inorganic earths; humus combines partly with the oxyen in a strictly chemical sense, and assumes a state of higher oxygenation, in consequence of which there is formed also some carbonic acid; the inorganic earths, on the contrary, absorb the oxygen gas without intimate combination; if dried in a higher temperature than from 167° to 189½° F., the oxygen escapes again, but they re-absorb it on being moistened; this experiment may therefore be many times repeated with the same earth.

4. In the case of earths which are frozen, or covered with a surface of ice, no absorption of oxygen takes place, any more than in the case of dry earths; in a moderately warm temperature, varying

between 59° and $65\frac{3}{4}$° F., the earths absorb in a given time more oxygen than in a temperature only a few degrees above the freezing-point.

5. When any fertile soils are entirely covered with water, and exposed at a warm season to the influence of sun light, confervæ begin usually to form very soon on their surface, what has been called the green matter of Priestley (*Protococcus viridis*, Agardh, and *Priestleya botryoides*, Meyen); as soon as these are formed, oxygen is developed through the influence of the sun-light on this vegetable matter; when this experiment is made in close vessels, a distinct increase is perceived in the air standing over the water: the oxygen contained in it was increased in some of my experiments to 25 and 27 per cent., though the atmospheric air of the vessels at the beginning of the experiments had, as usual, only a proportion of 21 per cent. contained in it; this phenomenon agrees with many other observations in rendering it probable that a portion of the oxygen gas, which during the warmer season suffers a diminution from so many processes of animal life and vegetation, is again compensated for by the action of sun-light on the products of the vegetable kingdom.

6. With regard to the reasons of this absorption of oxygen gas, they are partly founded on the general property of many porous bodies, in the damp state particularly, to absorb oxygen gas, without any direct chemical combination being formed by them with these bodies, as Ruhland has already accurately pointed out; and the principle of this absorption may partly be sought for in the proportion of humus and oxide of iron, which arable soils always contain in greater or less quantity; if the earths be previously burnt, and their portion of humus thus volatilized, while the oxide of iron is raised to a higher degree of oxidation, their power of absorption of oxygen becomes considerably diminished thereby, and in some instances disappears.

Phenomena explained by this absorption of oxygen gas.—Many phenomena prove that oxygen plays one of the most important parts in the economy of plants and animals; that in particular it is highly necessary in the germination of seeds and for the growth of plants; by loosening, digging, ploughing, and working the soil in any way, fresh layers of earth are brought successively into contact with the air, and fertilized, as it were, by the absorption of oxygen gas; from the above experiments, however, we infer that dryness influences this process unfavourably, and that it is therefore desirable to keep the soil in a moderately damp state, where that can be done.

2. Soil freshly brought up from below is generally found less fertile at first than it afterwards becomes when it has been exposed to the air and worked for a longer period; it seems by these

means to become for the first time saturated with the quantity of oxygen essential to vegetation, while at the same time it becomes looser, and enriched with greater portions of humus from manures or decaying vegetables.

3. Clay-soils containing humus exhibit a particularly strong absorption of oxygen; they maintain themselves also for a longer time moist in dry weather than the sandy soils; properties, both of which must contribute to the fertility of these soils, especially when they are at the same time sufficiently free.

4. In subterraneous cavities excluded from the air, for instance in mines, there occurs not unfrequently a production of suffocating air, or choke-damp, as it is called, a phenomenon which appears to be often a consequence of this absorption of oxygen gas. The strata which enclose these places being frequently damp and clayey, are consequently capable of absorbing easily the oxygen gas from the air included within them, while the mephitic air is thus left in their recesses: if these strata contain also humus, or especially if carbon be found in them, as is the case with coal-blende, pit-coal, &c., they will form carbonic-acid gas; should decomposition of water take place, in consequence of metallic agency, as might so easily ensue with the sulphuretted pyrites, hydrogen gas is set at liberty, and an explosive atmosphere becomes thus easily formed.

5. In the clay-soils, nitric acid and the nitric salts are frequently formed; this occurs particularly during the artificial production of saltpetre and in the slow process of saltpetre-beds; and is also found to take place spontaneously here and there in the upper beds of soil, independently of the effect of artificial means; the absorption of oxygen gas induced by the soil, has probably a very considerable influence in these formations of nitric acid.

VIII. *Power of the Earths to retain Heat.*—The earths have the property of giving out again to surrounding bodies, in different lengths of time, the warmth communicated to them by the sun or the temperature of the atmosphere, and of retaining, therefore, such warmth within themselves for a longer or shorter space of time; this may be termed their power of retaining heat. It is not identical with specific heat, as it does not depend merely on that condition, but on the different capacity as well, which bodies possess of conducting heat. It is generally of a higher degree in proportion as the specific heat of a body is greater, and its power of conducting heat is less; these two properties combined will constitute the power of retaining heat.

We may adopt the following process for examining the power of retaining heat. We place equal quantities of the several earths in the dry state in large vessels of similar size, made of thin

tin-plate, and having heated them to the same temperature, we observe, by means of a thermometer inserted in the middle of the mass, the time they respectively require to cool down again to the original degree of temperature.

The several earths gave me the following differences in this respect. I heated 30 cubic inches of earth in each case up to $144\frac{1}{2}°$ F., and observed in a close room, having the temperature of $61\frac{1}{4}°$ F., the time which they respectively required to cool down to $70\frac{1}{4}°$ F.; and having set down the power of retaining heat in the case of calcareous sand, as equal to 100, I reduced the remainder to this standard.

Kinds of Earth.	Power of retaining Heat, that of Calcareous Sand being = 100.0	Length of time required by 30 Cubic Inches of Earth to cool down from a temperature of $144\frac{1}{2}°$ to $70\frac{1}{4}°$ F. in a surrounding temperature of $61\frac{1}{4}°$.
Calcareous sand . .	100.0	in 3 hours, 30 min.
Siliceous sand . . .	95.6	3 — 20 —
Gypsum powder . .	73.8	2 — 34 —
Sandy clay . . .	76.9	2 — 41 —
Loamy clay . . .	71.8	2 — 30 —
Stiff clay, or brick-earth	68.4	2 — 24 —
Grey pure clay . .	66.7	2 — 19 —
Fine lime	61.3	2 — 10 —
Humus	49.0	1 — 43 —
Fine magnesia . . .	38.0	1 — 20 —
Garden-mould . .	64.8	2 — 16 —
Arable soil . . .	70.1	2 — 27 —
Slaty marl	98.1	3 — 26 —

General Remarks.—1. The sands possess the greatest power of retaining heat when the earths are compared in equal quantities according to bulk; hence may be explained the dryness and heat of sandy districts in summer. Such districts, after sunset, must also maintain a higher temperature and for a longer time than others the soils of which possess a smaller power of retaining heat; and the slight power which sandy soils possess of containing water, in consequence of which but little warmth is abstracted from them by evaporation, must still further increase the degree of this property.

2. The slaty marl stands next to sands in regard to its power of retaining heat; and having at the same time a greater power of containing water, this circumstance must contribute to its fertility.

3. Among the ordinary constituents of soil, humus is that which has the least power of retaining heat. Turf-soils, too, abounding in humus, grow warm but slowly, because they are

endued with a very great power of containing water, and have, in the first place, to lose by evaporation a portion of this water contained in them.

4. The small power of retaining heat evinced by fine magnesia, prepared artificially, would seldom be the same as that which this earth would have as a mixed ingredient occurring naturally in soils, being usually found under such circumstances in a coarser form combined with other earths, as in sands and slaty marls, which possess a great power of retaining heat.

5. If we compare in the earths their power of retaining heat with their other physical properties, we shall find it to be most nearly in proportion to the weight of a determinate volume, that is, to the absolute weight; the greater mass an earth possesses in the same volume, the greater will be in general its power of retaining heat; we may, therefore, from the absolute weight of an earth, conclude, with a tolerable degree of probability, as to its greater or less power of retaining heat.

IX. *Warming of Soils by the Sun.*—The earths acquire heat from the sun in different proportions, and this property may exert a sensible influence on vegetation; upon it, therefore, may be founded, in some degree, the terms of a cold or hot soil. Land consisting of a light-coloured clay is warmed much more slowly and less powerfully by the sunlight, than one consisting of a dark-coloured dry soil; black garden-mould, rich in humus, becomes much warmer than meagre limestone or clay soils.

Very different external circumstances have an influence on the degree of warmth thus imparted, and these may be referred to the following four points:—1. The different colour of the surface of the earth; 2. The different degree of dampness in which the earth exposed to the sun's rays happens to be at the time; 3. The different component materials of the soil itself; and 4. The different angle at which the rays of the sun fall upon the soil: the influence of each of these circumstances requires to be examined.

Influence of the Colour of Soils on the warmth received by them from the Sun.—The influence of colour on the amount of heat may be observed easily in the following manner. We place thermometers in the several soils, covering their bulbs about an eighth of an inch high with earth; in order to impart to each a different colour, we sprinkle them over respectively with differently coloured powders, leaving one of them exposed to the sunlight in its natural state and colour; for the communication of a black colour we may employ the soot obtained in the combustion of fir and resin (lamp-black); and for a white colour, fine magnesia; these are to be sprinkled over the surface of the soils by means of a fine lawn sieve.

When soils are, under these circumstances, exposed to the heat of the sun, the black-coloured specimen always attains a considerably higher temperature than the naturally grey-coloured, and the latter again a higher one than the artificially white-coloured earth; the differences of temperature, in these cases, amounting usually to many degrees. In experiments, which I made on this subject, in the latter end of August, when the temperature of the air in the shade was 77° F., that of the surface of black-coloured sand rose from 77° to 123½° F.; that with the natural colour to 112½° F.; and that, on the contrary, with the white, to only 110° F. That is to say, while the warmth of the white-coloured sand rose 33°, that of the black-coloured sand rose 46½°, or almost one-half more. The other earths exhibit corresponding differences. When the differently-coloured earths are even exposed for hours to the sun, they never attain the same degree of temperature, the lighter-coloured earths always remaining considerably cooler, while the black-coloured acquire the greatest degree of heat.

Hence we see why the mere sprinkling of earth, ashes, or other powders of a dark colour on snow, accelerates its melting; and also why the dark colouring applied to inside and outside walls, or the naturally dark colour of many kinds of slate and slaty marl, has the effect of accelerating the ripening of fruit, as grapes, melons, &c., planted against them.

Influence of Moisture on the Warming of Soils.—The influence of the damp or dry state of soils on their acquisition of warmth is also considerable. If we expose earths of the same kind in a dry and wet state to the sun, the wet earth never attains the same degree of heat; its temperature, as long as it remains moist, being always many degrees less than it would acquire in a dry state. The depression of temperature arising from the evaporation of their water, amounts to 11¼° or 13½° F.

As long as the several earths, at the early part of the experiment, remain saturated with water, they exhibit but little difference in their power of acquiring heat, as they give off to the air, in this state of saturation with water, nearly equal quantities of vapour, in the same time; when they have become, however, in some measure dried in the air, their differences of temperature are found to become greater; light-coloured earths, with great powers of containing water, acquire heat in consequence the most slowly, while dark-coloured sand and slates, on the contrary, with less powers of containing water, become warm on both these accounts, in a quicker and more powerful manner.

Influence of the different Materials constituting Soil, on its acquisition of Heat.—The different ingredients which enter into the composition of soils have, in themselves, far less influence on

the capacity of soils to become warmed by the sun, than their colour and dryness. If we impart to earths artificially the same colour, and expose them in a similar state of dryness to the heat of the sun, the differences of temperature will be inconsiderable; so that the differences in this respect shown by the several earths in their natural state may be referred in a particular manner to these two leading circumstances, colour and dryness.

The following table contains the results of a series of experiments which I made on the different degrees in which earths acquire warmth from the sun in fine weather. I placed these earths in vessels of four square inches in surface and half an inch deep, and exposed them to the rays of the sun, coloured differently on the surface, and furnished with thermometers as already described; the observations were made in the latter part of August, and between 11 and 3 o'clock in the day, while the temperature of the air varied in the shade from 72½° to 77° F. As all the observations could not be made at once, the temperature which sand acquired on the same occasion was in each case taken as the standard of comparison, to which all the several observations have been reduced.

Kinds of Earth.	Mean of Highest Temperature of the upper surfaces of the Earths. (77° F. in the shade.)			
	With a surface of the natural colour.		With dry earth.	
	Wet.	Dry.	With a white surface.	With a black surface.
Siliceous Sand, bright yellowish-grey	99°.1	112°.6	109°.9	123°.6
Calcareous Sand, whitish-grey . .	99.3	112.1	109.9	124.0
Gypsum, bright white-grey . . .	97.3	110.5	110.3	124.3
Sandy clay, yellowish	98.2	111.4	108.3	121.6
Loamy clay, yellowish	99.1	112.1	107.8	121.1
Stiff clay, or brk. earth, yellowish-grey	99.3	112.3	107.4	120.4
Fine bluish-grey clay	99.5	113.0	106.3	120.0
Lime, white	96.1	109.4	109.2	122.9
Magnesia, pure white	95.2	108.7	108.7	121.3
Humus, brownish-black	103.6	117.3	108.5	120.9
Garden-mould, blackish-grey . . .	99.5	113.5	108.3	122.5
Arable soil, grey	97.7	111.7	107.6	122.0
Slaty marl, brownish-red . . .	101.8	115.3	108.3	123.4

Influence of the Inclination of the Ground on the amount of Warmth it acquires from the Sun.—The inclination of the ground towards the sun has a very considerable influence on the degree of warmth which the soil receives from its rays; and the amount of warmth so produced is, under similar circumstances, always greater the more nearly the incidence of the ray approaches to a

right angle, or 90 degrees, with the surface. If the actual increase of temperature produced by the rays of the sun beyond the temperature in the shade be between 45° and 63°, as is often the case on clear summer days, this increase would be only half as great if the same light spread itself in a more slanting direction, over a surface twice as large. Hence it is sufficiently explained why even in our own climate the heat so frequently increases on the slopes of mountains and rocks, which have an inclination towards the south. When the sun is at an elevation of 60 degrees above the horizon, as is more or less the case towards noon in the middle of summer, the sun's rays fall on the slopes of mountains which are raised to an inclination of 30 degrees to the horizon, at a right angle; but even in the later months of summer, the sun's rays frequently fall on them under a right angle, in cases where the slopes are yet steeper. Such declivities, particularly in our own geographical latitude (of Germany), are therefore peculiarly suited for the cultivation of plants which require a high temperature, such for instance as the vine.

If we compare accurately the power of the sun's rays to warm the soil with reference to the different seasons, we shall perceive more distinctly the influence of the different inclination of the ground towards the sun. I made some careful observations at Tübingen some years ago on this subject, the results of which I have arranged in the following table, in comparison with other observations which I had made previously at Geneva. Those observations, which are marked as having been made in fine weather, exhibit the mean highest temperature of an ordinary blackish-grey garden-mould, the temperature of which was observed on the south side of my house, in perfectly fine weather, between noon and one o'clock, whenever the weather happened to be perfectly fine at that part of the day. They are founded on the average of two years' observations: the bulb of the thermometer was covered only the twelfth of an inch high with earth, and its scale being of clear glass could contribute nothing to the elevation of temperature. Those figures in the table which refer to variable weather rest on observations made in the Botanic Garden at Geneva, in the year 1796: they contain the mean of the observations made every day, and not merely of those taken in fine weather. The elevation of temperature by the rays of the sun was therefore considerably less according to the average results of these observations, because the temperature of the upper surface of the earth on cloudy and rainy days often accords exactly with that of the air; but on the other hand, they give us more accurately the mean temperature of the ground at some depth.

Months.	In perfectly Fine Weather. Mean Temperature of the Earth's Surface.	In perfectly Fine Weather. Mean Temperature of the Air in the Shade.	Elevation of Temperature by the Sun's Rays in Degrees.	In Variable Weather: Mean of the whole Month. Mean Temperature. Of the Earth's Surface at Noon.	At three Inches below the Soil.	At four Feet below the Soil.	Of the Air in the Shade.
January	54°.1	24°.6	29°.5	43°.0	38°.5	39°.4	38°.2
February	86.2	43.0	43.2	45.7	39.8	38.6	36.8
March	99.5	46.6	52.9	53.2	43.2	38.1	38.1
April	121.6	61.7	59.9	78.9	60.7	48.3	50.1
May	131.2	67.3	63.9	80.1	64.4	54.6	55.9
June	139.8	75.2	64.6	89.1	73.6	61.5	60.9
July	146.3	81.3	65.0	93.4	73.3	64.9	63.2
August	130.1	68.9	61.2	96.0	76.9	68.6	65.8
September	119.8	68.0	51.8	82.8	70.2	66.1	62.4
October	80.8	42.8	38.0	59.8	54.4	58.8	51.8
November	72.7	40.1	32.6	47.3	43.7	49.0	41.6
December	59.2	35.6	23.6	35.3	33.3	39.0	32.1
Means	103.4	54.6	48.8	67.1	56.0	52.3	49.7

The highest temperature occasioned by the mere heat of the sun in the last two years, I observed on the 16th of June, 1828; the thermometer placed in the earth rose on that day at noon (the wind being west, the weather calm and perfectly fine, and the temperature of the air in the shade 78° F.) to 153½ F., and therefore 75½° higher than in the shade; it attained to nearly the same height on the 21st of June, on which day (with the temperature of the air 84½°, and a brisk east wind) it rose to 151¼°, and therefore 66¾° higher than in the shade; on other days I remarked further that when the weather was windy, while the temperature was the same in the shade, the temperature of the earth in the sun rose to a less elevation. The smallest difference I ever observed was on the 11th of January, 1829, when there was a brisk east wind; the temperature I obtained in the shade on that day was, even at noon, 18° below the freezing-point, and the temperature of the surface of the earth in the sun rose only to 6¾° above the freezing-point. The highest temperature observed in the Botanic Garden at Geneva, in the years 1796 and 1797, in contact with the surface of the earth, was 125°.4, which occurred on the 30th July, 1797:—

The highest, 3 inches deep below the surface	99°.5	July 26—29,	1797
The highest, 4 feet deep below the surface	73°.2	Aug. 1—4	„
The lowest, 3 inches deep below the surface	23°.0	Dec. 12	„
The lowest 4 feet deep below the surface	35°.8	Jan. 26 to Feb. 13	„

The reason why the temperature observed at Geneva on the several days, in contact with the surface of the earth, rises to a less degree than at Tübingen, depends perhaps on the higher and probably more windy situation in which the thermometer was placed,—Geneva lying 1334 and Tübingen only 1076 English feet above the level of the sea; nor is it unlikely that the bulb of the thermometer at Geneva was rather deeper in the earth, and in a situation proportionally less warm, namely, exposed to a northern aspect.

X. *Capacity of Soils to develope Heat within themselves on being moistened.*—It has already been mentioned (in a former part of my 'Agricultural Chemistry,') that powdery substances in general, and consequently the earths, possess the property of developing warmth when moistened while in a dry state; and the results obtained on this subject with different bodies have been already communicated in a tabular form. We might suppose that this property in the case of the earths of the soil would be of important influence on the fertility of the land; this does not, however, appear to be the case. The earths develope warmth in this manner only when moistened after a previous state of perfect dryness; but, in nature, they are scarcely ever found in this perfectly dry condition; and even when dried artificially, the development of heat in the case of ordinary earths is always very inconsiderable, amounting in general to only ½° or 1° F.: even with dry humic acid and artificial turf-earth, I could detect no greater a development of heat. The falling rain in warm seasons is many degrees colder than the lower stratum of the atmosphere and the upper surface of the earth, which it immediately moistens; so that the earth in hot weather becomes rather cooled than otherwise by the rain; this property of the earths at the utmost can therefore have, perhaps, the effect of diminishing the cooling of the earth by rain some half or whole degree of Fahrenheit, when the earth previously has been very dry: such a result can have but a very inconsiderable influence on vegetation; and in the colder seasons, when the earth is already damp, so slight a development of heat must be inappreciable.

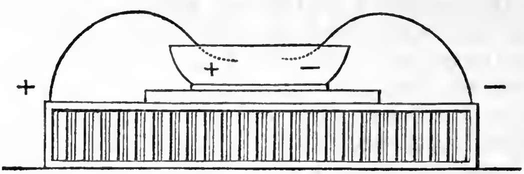
XI. *Galvanic and Electrical Relations of the Earths.*—The electrical relations of bodies stand in such manifold relations to chemical and organic processes, that the properties of the earths, even in this respect, deserve consideration.

Electric Conducting Power.—The pure earths, as sand, lime, magnesia, gypsum, in their dry state, are non-conductors; the clays, on the contrary, are imperfect conductors; and the compound clayey earths are weak imperfect conductors. The presence of the

moisture and of oxide of iron, which are found in all the clays, appears to be the principle of this phenomenon.

Power of exciting Electricity.—All the earths develope negative electricity when oblong dry pieces of them are scraped with a knife, and the resulting particles immediately received on the plate of an electrometer; the voltaic straw-stalk electrometer, by this manipulation, generally exhibits divergences of from 4 to 5 degrees: ice treated in the same manner gives positive electricity.

Polar-electric Relation.—When solutions of humus in alkalis and earths (the humic acid salts) are exposed to the current of the voltaic battery, decomposition immediately ensues; the humus, or peculiar humic acid, collects in brown flakes around the positive or zinc end of the apparatus, while the earths or alkalis



arrange themselves around the copper or negative end of the polar wire; humus, therefore, assumes in relation to the remaining earths the character of an acid, a circumstance which I pointed out, when I first made the experiment in the year 1817, in the fifth part of the Agricultural Journal of Hofwyl.

Influence of the simple Earths on the Germination of Seeds.—When we allow grain to germinate in the simpler earths, the young plants will, for some time, develope themselves as long as the earths possess the proper looseness and also remain sufficiently moist and at a proper temperature; conditions, which, according to what has been already said, on the capability of earths to become dry, must occur in different degrees; independently, also, of the moisture and warmth, the consistence of the earths has a great influence on the development of the germ; for if they have too great a consistence, the seeds lie in them without growing.

The several earths, in my investigations, exhibit the following differences in this respect:—

In moist siliceous and calcareous sand, the grains germinated in summer in a few days, and developed themselves well for some time, but suffered on the approach of hot weather.

In gypsum powder, the young plants became developed but indifferently; from the alternation of moisture and dryness, a crust

soon formed itself upon the surface, which the young plants could not break through without difficulty. As gypsum is in some degree soluble in water, this circumstance may easily contribute to the formation of the crust, since some portion of the gypsum becomes dissolved whenever moisture is applied, and again hardens on the evaporation of the water.

In sandy clay, no proper development took place; a radicle and plumule, about an eighth of an inch long, were indeed developed, but they soon died away before breaking through the clay, a crust having formed on the surface, through which the germinating seeds were unable to penetrate.

In the loamy and the stiff clay, the same phenomenon occurred, but in a more distinct manner.

In the pure clay, no development took place at all: even after fourteen days had elapsed, neither plumule nor radicle was to be seen, although during this period the due alternation of dryness and moisture had been properly maintained; in other respects, however, the seed-corn had not suffered by it, for when afterwards placed in a loose soil it grew very well. We thus see how it is that the seeds of many plants are capable of lying for a length of time undeveloped in the soil, and afterwards, at a later period, on being placed under more favourable external circumstances, of springing up.

In pure carbonate of lime, carbonate of magnesia, and slaty marl, as well as in pure humus, garden-mould, and arable-soil, the seeds germinated well; the young plants in warm weather developing themselves the most beautifully in the humus and in the carbonate of magnesia, in consequence, probably, of the greater power of containing water which these earths possess.

SYNOPTICAL VIEW of the most important PHYSICAL PROPERTIES of Surface of Cultivated Ground

KINDS OF EARTH.		Specific Gravity of the several Specimens: that of Water being 1000.	Weight of a Cubic Inch and Foot. In the Dry State.	Weight of a Cubic Inch and Foot. In the Wet State.	Power of containing Water. 100 parts retain of Water, according to Weight.	Power of containing Water. 100 parts retain of Water, according to Volume.	Firmness and Consistency of the Soil. In the Dry State: that of Clay being = 100.0.	Firmness and Consistency of the Soil. In the Wet State. Adhesion to a Surface of one square Foot. Iron.	Firmness and Consistency of the Soil. In the Wet State. Adhesion to a Surface of one square Foot. Wood.
					Per cent.	Per cent.		lbs.	lbs.
Siliceous Sand	Occurring in almost every arable soil	2653	495 gr. 111.3 lbs.	605 gr. 136.1 lbs.	25	37.9	0	3.8	4.3
Calcareous Sand	Frequently occurring along with Siliceous Sand	2722	505 gr. 113.6 lbs.	628 gr. 141.3 lbs.	29	44.1	0	4.1	4.4
Sandy Clay	A combination of 45 per cent. of fine sand, with 55 per cent. of clay	2601	435 gr. 97.8 lbs.	577 gr. 129.7 lbs.	40	51.4	57.3	7.9	8.9
Loamy Clay	A combination of 24 per cent. of fine sand, with 76 per cent. of clay	2581	393 gr. 88.5 lbs.	551 gr. 124.1 lbs	50	57.3	68.8	10.6	11.4
Stiff Clay, or Brick-earth	A combination of 10 per cent. of fine sand, with 90 per cent. of clay	2560	357 gr. 80.3 lbs.	531 gr. 119.6 lbs.	61	62.9	83.3	17.2	18.9
Clay, in its fine pure state	58 per cent. of silica, 36.2 of alumina, with 5.8 per cent. of protoxide of iron	2533	334 gr. 75.2 lbs.	515 gr. 115.8 lbs.	70	66.2	100.0	27	29.2
Lime, in its fine state of Carbonate		2468	244 gr. 53.7 lbs.	460 gr. 103.5 lbs.	85	66.1	5.0	14.3	15.6
Magnesia, in its fine state of Carbonate		2194	75 gr. 15.8 lbs.	339 gr. 76.3 lbs.	256	76.1	11.5	5.8	7.1
Gypsum-Powder, in its fine unburnt state		2331	408 gr. 91.9 lbs.	573 gr. 127.6 lbs.	27	38.2	7.3	10.7	11.8
Slaty-Marl (such as mentioned at p. 178)		2631	498 gr. 112 lbs.	624 gr. 140.3 lbs	34	49.9	23.0	4.9	5.5
Humus	or Humic Acid, an essential ingredient of fertile soil.	1370	154 gr. 34.8 lbs.	346 gr. 81.7 lbs.	181	69.8	8.7	8.8	9.4
Fertile Garden-Mould (such as mentioned at p. 178)		2332	364 gr. 68.7 lbs.	457 gr. 102.7 lbs.	89	67.3	7.6	6.4	7.5
Common Arable Soil (such as mentioned at p. 178)		2401	376 gr. 84.5 lbs.	529 gr. 119.1 lbs.	52	57.3	33.0	5.8	6.4

SOIL, in reference to VEGETATION, as shown by those Earths of which the is most generally composed.

Capability of Drying.		Diminution of Volume on Drying.	Absorption of Moisture from the Atmosphere.		Absorption of Oxygen Gas from the Atmosphere.		Power of retaining Heat.		Warming of the Earths in the Sun. Temperature of their Surfaces (in the same general Temperature of the Air in the Shade).				Electrical and Galvanic Relations.	
			1000 Grains absorbed, in						With Surfaces of the Natural Colour.		With Dry Earth.			
Water evaporated from 100 Parts in equal times.	Time required by equal Portions to Dry to the same degree.	1000 Parts lose in Volume.	Hours.	Grains.	In the perfectly Dry State.	In the Wet State. The Earths absorbed in 30 Days, from 21 per cent. of Oxygen Gas.	That of Calcareous Sand being = 100.	Length of time required by 30 cubic Inches of Earth to cool.	With Wet Earth.	With Dry Earth.	With White Surfaces.	With Black Surfaces.	Polar-Electric relation to Humus. (— negative, + positive.)	Power of Conducting Common Electricity.
Parts.	H. min.	Parts.				Per cent.		H. min.	°	°	°	°		
88.4	4 4	0	12 24 48	0 0 0	0	1.6	95.6	3 20	99.1	112.6	109.9	123.6	—	Non-conductor.
75.9	4 44	0	12 24 48	2 3 3	0	5.6	100.0	3 30	99.3	112.1	109.9	124.0	-	Non-conductor.
52.0	6 55	60	12 24 48	21 26 28	0	9.3	76.9	2 41	98.2	111.4	108.3	121.6	—	Imperfect conductor.
45 7	7 52	89	12 24 48	25 30 34	0	11.0	71.8	2 30	99.1	112.1	107.8	121.1	—	Imperfect conductor.
34.9	10 19	114	12 24 48	30 36 40	0	13.6	68.4	2 24	99.3	112.3	107.4	120.4	—	Imperfect conductor.
31.9	11 17	183	12 24 48	37 42 48	0	15.3	66.7	2 19	99.5	113.0	106.3	120.0	—	Imperfect conductor.
28.0	12 51	50	12 24 48	26 31 35	0	10.8	61.3	2 10	96.1	109.4	109.2	122.9	—	Non-conductor.
10.8	33 20	154	12 24 48	69 76 80	0	17.0	38.0	1 20	95.2	108.7	108.7	121.3	—	Non-conductor.
71.7	5 1	0	12 24 48	1 1 1	0	2.7	73.8	2 34	97.3	110.5	110.3	124.3	±	Non-conductor.
68.0	5 53	35	12 24 48	24 29 32	0	11.0	98.1	3 26	101.8	115.3	108.3	123.4	—	Imperfect conductor.
20.5	17 33	200	12 24 48	80 97 110	0	20.3	49.0	1 43	103.6	117.3	108.5	120.9	+	Non-conductor.
24.3	14 49	149	12 24 48	35 45 50	0	18.0	64.8	2 16	99.5	113.5	108.3	122.5	±	Weak imperfect conductor.
32.0	11 15	120	12 24 48	16 22 23	0	16.2	70.1	2 27	97.7	111.7	107.6	122.0	±	Weak imperfect conductor.

Comparative Review of these Results.—In the preceding Table I have brought the principal results obtained from the several earths into a comparative view, in order to show at once those different properties, the joint operation of which exercises so great an influence over the processes of vegetation. With respect to the different variations of these properties in the earths, I must refer back to the paragraphs in which they have been severally treated. This tabular arrangement will much facilitate the critical examination of the physical properties of the several kinds of soil, and may relieve others from the necessity of undertaking anew, in every examination they may wish to institute, those researches which I have myself often found both troublesome and tedious.

In the examination of soils, the determination of their power of containing water, and of their weight, consistency, and colour, in connexion with their chemical analysis, will, in the majority of cases, be sufficient to enable us to conclude, with great probability, as to their remaining physical properties. The more an earth weighs, the greater also in general is its power of retaining heat; the darker its colour and (at the same time) the smaller its power of containing water, the more quickly and strongly will it be heated by the sun's rays; the greater its power of containing water, the more has it in general the power also of absorbing moisture when in a dry, and oxygen when in a damp, state from the atmosphere, and the slower it usually is to become dry, especially when it is endued at the same time with a high degree of consistency; lastly, the greater the power of containing water and (at the same time) the consistency of a soil, the colder and wetter of course will that soil be, as well as the stiffer to work either in a wet or dry state, and the more judicious therefore will it be to break it up before the setting in of the frost, in order that its consistency may be improved by the due penetration of the frost during the winter; and, for the cultivation of many plants, the more requisite will it be found for the permanent improvement of such a soil, to counteract its too great consistency and power of containing water, by mixing with it looser earths, as lime, marl, and sand.

NOTE A (*referred to in page* 185).

On the Employment of the Power of Containing Water in the Examination of the Constituents of a Soil.—Cadet de Gassicourt, in modern times, has proposed what he considers an easy and practicable method for farmers to ascertain with great probability the fertility and constituents of a soil, founded on its power of containing water, and without their having recourse to chemical re-agents;* a method we cannot omit noticing in detail on this occasion, as many agricultural works have already referred to it, without however at the same time subjoining any accurate comparative trials of its practicability. We place 400 grammes (that is, a little more than 14 avoirdupois ounces) of earth, previously sifted and dried at 122°, on a filter of which the weight has also been found, and pour over it an equal quantity of water, observing the increase of weight in the moistened earth, and the time the water takes to pass through it: we repeat this experiment four times, and take the average of the whole. In order to obtain the probable fertility, we look into the following Table, and ascertain which of the calculations it is that the quantity of absorbed water, and the time of absorption, most nearly approaches: in order to be able to compare these results more nearly with those already given, I include in a column of the Table the power of containing water per cent. as calculated from these data:—

Quantity of water absorbed by 400 grammes, or 7527 grains.	Power of containing water per cent.	Time of the experiment, in hours.	Probable Constituents of the Earth.
Grammes.			
80 to 90	20 to 22	3 to 4	Almost pure sand, or with very little lime.
100 ,, 110	25 ,, 27.5	1 ,, 1½	Almost pure sterile limestone.
120 ,, 130	30 ,, 32.5	3 ,, 4	Light sandy earth, heath-land, with about ⅕th clay.
120 ,, 130	30 ,, 32.5	1 ,, 2	But little fertile, doubtless calcareous.
180 ,, 195	45 ,, 49	5 ,, 5½	Arid, and when grey probably calcareous.
180 ,, 195	45 ,, 49	8 ,, 9	Rather heavy soil, with almost ⅔rds clay.
240 ,, 250	60 ,, 62	9 ,, 10	Heavy, and without doubt very fertile.
320 ,, 350	80 ,, 87	11 ,, 12	Firm clay soil.
325 ,, 335	81.2 ,, 83.7	20 ,, 24	Almost pure clay.
350 ,, 360	87.5 ,, 90.0	7 ,, 8	Marl soil, calcareous sterile clay.
390 ,, 400	97.5 ,, 100	1 ,, 2	Vegetable garden-manure-soil, good to use as manure, or to mix with heavy soil or sand.

Let us compare the results of this Table with what has already been said on the power of the several earths to contain water, and

* Bibliothèque Universelle, section 'Agriculture,' tome 1, p. 97. Genève, 1816.

it will appear, that we may conclude, from this power of a soil, when it exceeds a certain fixed minimum or maximum, with great probability on the unfruitfulness of a soil; but that, with the soils which most frequently occur, and have a medium power of from 40 to 60 per cent., many cases present themselves in which, without the assistance of chemistry, we should remain in doubt as to the fruitfulness or unfruitfulness of a soil: since the fineness of the particles of earths has so considerable an influence on their power of containing water, we ought on that account only to be very doubtful in forming conclusions respecting their constituent parts. A power of containing water, of from 25 to 28 per cent., which, according to this Table, indicates a pure sterile limestone soil, might equally belong to a soil consisting of siliceous sand or gypsum powder; a power of containing water of from 60 to 62 per cent., belonging, as it most frequently does, to a fertile heavy soil, as given by the Table, may moreover apply equally to a clay soil (between a sandy clay and a loamy clay) without humus, and perfectly sterile; likewise a power of containing water of from 87 to 90 per cent., which this Table sets down as a marl soil or calcareous sterile clay, may belong to very fertile arable and garden soils, supplied with the due quantity of humus.

The minuter distinctions of the power of containing water, in the case of mixed earths, may be ascertained from the following comparison, in which I distinguish the fertile and the sterile earths, arranged according to their power of containing water by weight; subjoining to each kind, for the purpose of further comparison, a brief notice of its predominating materials, as far as they have an especial influence on that power, with remarks appended on its fertility, (the subject of the chemical elements of compound soils being treated more minutely in another section of my work.) The soils of the Rhein-Gau here given were examined, in reference to this object, by Professor Geiger, of Heidelberg;* those of the country of Göttingen, East Friesland, and Lüneburg, by Dr. Sprengel of Göttingen;† and the remainder by myself.

* Metzger's Rhenish Vine-Cultivation. Heidelberg, 1827, p. 225.

† Erdmann's Journal of Technical and Economical Chemistry, No. 4, 1829, p. 1, &c.

Power of containing Water.	KINDS OF EARTH.
20	VINEYARD SOIL of Rotheberg, near Gaissheim, in the Rhein-Gau—a great preponderance of siliceous earth, with particles of clay-slate, and some lime, with 3.3 per cent. of humus and volatile matter.
25	VINEYARD SOIL of Neudorf, in the Rhein-Gau, of similar composition, containing 5.2 per cent. of humus and volatile matter.
25	STERILE SANDY SOIL from the Vogelsang, near Göttingen—88 per cent. of sand and flinty matter, with some lime, clay, and 4.2 humus and volatile matter.
28	VINEYARD SOIL from Rüdesheim, in the Rhein-Gau—similar to the two first vineyard soils, with somewhat more lime, and 8.3 per cent. of humus and volatile matter.
35.5	VINEYARD SOIL of Liebfrauenkirche, near Worms — 66.5 per cent. of sand, with fragments of sandstone and slate, 19 per cent. of lime, some clay, and 8 per cent. of humus and volatile matter.
35.7	VERY FERTILE ARABLE SOIL of East Friesland—64.8 per cent. of (in a great measure) fine silica, 9.7 of lime, 5.7 of alumina, with 11.2 of humus and volatile matter.
37.0	VINEYARD SOIL of Johannisberg, in the Rhein-Gau — 54 per cent. of sand (consisting of particles of clay, slate, and quartz), 9 per cent. of lime, 37 of clay, and 5.5 of humus and volatile matter.
38.2	SANDY SOIL from the Black Forest—77 per cent. of quartz-sand, with 20.1 of clay, some lime, and 1.3 of humus and volatile matter: beautiful pine-forests.
40.7	VINEYARD SOIL from the superior vineyards in the valley of the Neckar, near Untertürkheim—60 per cent. of sand with slaty marl, 24.4 of clay, 12.7 of lime, and 5.6 per cent. of humus and volatile matter.
42.0	VINEYARD SOIL from the 'Golden Cup' at Steinberg, in the Rhein-Gau—44 per cent. of sand, and 56 of deposit; the latter consisting of clay, with 0.4 per cent. of lime, and 8.8 of humus and volatile matter.
46.7	FERTILE ARABLE SOIL from the corn-fields in the valley of the Neckar, near Tübingen, a calcareous clay land — 62 per cent. of clay, 28.8 of siliceous sand, 3.4 of lime, and 5.7 of humus and volatile matter.
49.2	FERTILE ARABLE SOIL of Göttingen—83.3 per cent. of siliceous sand, with (in a great measure) fine deposited silica, 5.1 of alumina, 1.8 of lime, and 5 per cent. of humus with volatile matter.

Power of containing Water.	KINDS OF EARTH.
49.2	STERILE CLAY-SOIL from the Lüneburg district—77.8 per cent. of siliceous sand and silica, 8.1 of oxide of iron (with much protoxide), 4.4 of humus and volatile matter, without carbonate of lime.
50.0	FERTILE ARABLE SOIL of the corn-fields near Stuttgart—70.6 per cent. of clay, 25.2 of siliceous sand, 1.2 of lime, and 7.8 of humus with volatile portions.
53.0	VINEYARD SOIL of Uhlbach, in the valley of the Neckar—50 per cent. of siliceous sand with slate particles, 46 of clay, 3 of lime, with 7 of humus and volatile portions.
61.3	FERTILE ARABLE SOIL of the corn-fields of the valley of the Neckar, near Tübingen—64.7 per cent. of clay, 17.2 of siliceous sand, 16.4 of lime with calcareous sand, and 9.8 of humus with volatile portions.
67.2	FERTILE ARABLE SOIL of the corn-fields near Schwenningen, at the source of the Neckar—63.6 per cent. of clay, 17.3 of siliceous sand, 4.1 of lime and calcareous sand, and 5.6 of humus and volatile matter.
78.1	GOOD MEADOW LAND of Bebenhausen—46.7 per cent. of clay, 46 of sand, 3 of carbonate of lime, and 4.5 of humus and volatile matter.
85	GOOD MEADOW LAND of Lustnau, in the valley of the Neckar—48 per cent. of clay, 20.8 of siliceous sand, 29.6 of fine lime with calcareous sand, and 6.3 of humus with volatile matter.
91.6	VERY FERTILE BLACK SOIL from the upper region of the Suabian Alps, on the Jura limestone—47 per cent. of clay, 1.2 of siliceous sand, 33.8 of calcareous sand with lime, 4.6 of soluble humus, and 13.1 of volatile portions.
100	LIGHT GARDEN-MOULD, abounding in vegetable matter and sand, excellent for the cultivation of heaths, proteas, and similar plants of the Cape—1.6 per cent. of lime, 18.6 of (for the most part) vegetable volatile matter; the remainder being sand, containing clay.
106	A GARDEN-MOULD, similar to the last, excellent for the cultivation of many of the New Holland shrubs, several kinds of the Metrosideros, Melaleuca, and similar plants—21 per cent. of volatile matter, with 15.5 of lime; the remainder being clayey sand.
124	VERY LIGHT SOIL, (but little adapted however for the general cultivation of plants,) from the valley of the Neckar, near Lustnau—42.7 per cent. of clay, 10.8 of siliceous sand, 38 of lime with much calcareous sand, 8.4 per cent. of humus with volatile matter; consistence, very slight.

Power of containing Water.	KINDS OF EARTH.
155	GARDEN-MOULD, abounding in vegetable matter, good for the cultivation of Azaleas, Vacciniums, the Daphnes and Rhododendrons, and similar plants—11 per cent. of lime, and 30 of volatile matter with clay and sand.
179	BLACK STERILE TURF-SOIL, containing much carbonized humus, and, in the whole, 76 per cent. of volatile matter.
203	VEGETABLE SOIL, formed from decomposed leaves, and therefore called leaf-soil; employed for the artificial composition of various garden-moulds — 33 per cent. volatile matter, with 16 of fine lime; the remainder being fine alumina and silica.
210	WOOD-SOIL, from decayed trees; employed, like the leaf-soil, in the formation of garden-moulds, in which various Cape and New Holland shrubs are intended to be grown—47 per cent. of volatile matter, with 10 of fine lime; the remainder being fine clay and silica.
366	VERY LIGHT STERILE BROWN TURF-SOIL, from imperfectly developed turf, containing 89 per cent. of volatile parts.

It results from this tabular view, that compound earths exhibit still greater differences in their power of containing water than could have been expected from the table of Gassicourt; the soils employed in the climate of Germany for the cultivation of corn appear to vary generally, in their power of containing water, between 40 and 70 per cent.: when such power is considerably greater or less, the soil is adapted much better for the cultivation of certain plants,—namely: if less, for that of the vineyards, and fir woods; if greater, for meadows, or the cultivation of individual families of plants, of which several instances are furnished by the preceding table: but there still remains much on this point to be established by more extended observation; and it will only be after much experience and varied experiments, that we shall be able to say with what power of containing water this or that plant will with most certainty attain its perfect state; the mean quantity of rain and the mean temperature of a country being necessarily of great influence on this point: in such warm countries as have also a small mean quantity of rain, those kinds of soil which have a great power of containing water will, if other circumstances are the same, be the best; while those soils which have, on the contrary, a small power of contain-

ing water will be found better suited for countries with a greater amount of rain. Those very soils, therefore, may be fertile for one country which become no longer so for another, under a change of external circumstances: the usual alternation of dry and wet years being, on the same principle, more favourable to the one or to the other country, according as their predominating soils respectively possess a greater or a less degree of this power of containing water.

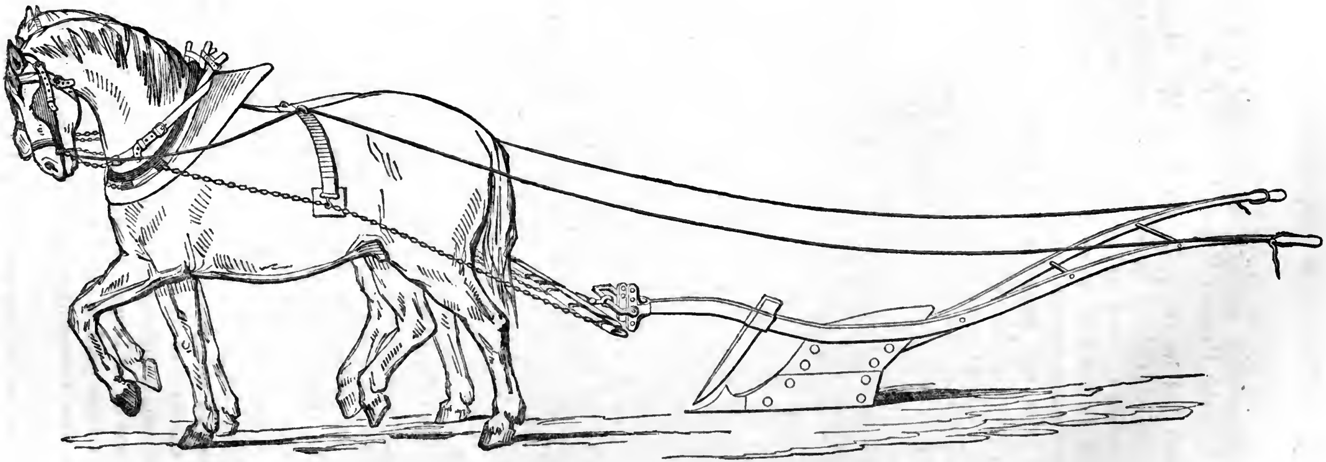
XXI.—*Experimental Inquiry on Draught in Ploughing.*—By PHILIP PUSEY, Esq., M.P., F.R. & G.S.

HAVING been led by the prize-essay of Mr. Handley to make some comparative trials of the draught of various ploughs, I beg to lay an account of these before the Society, in the hope that, if others should be induced to make similar inquiries, we may in the end obtain some certain results.

The first trial was made in last September, between an old Berkshire plough (with a high gallows in front, and a wooden mould-board), taken from one farm of the parish in which I write; a small one-wheeled wooden plough, with iron mould-board, made by Mr. Hart, of Wantage, in this neighbourhood, and employed on the other farm; the Rutland plough of Messrs. Ransome, which I selected because its draught was marked as the lightest in Mr. Handley's paper; and some other ploughs which I need not now particularize. The field was a clean oat-stubble, the soil a sandy loam moist with rain; the furrow 9 inches wide and 5 deep. The draught of the old Berkshire was about 3 cwt., of the Wantage plough less than 2 cwt., and of the Rutland plough somewhere between these two numbers. Thus it appeared that, within one small parish, the same work was performed on the one farm by two horses, as on the other by three (the smallest number ever attached to the old Berkshire plough), and that too with greater ease to the two horses than to the three. It was also a matter of surprise to me to find that even in this neighbourhood we possessed an implement lighter than any plough produced at the Oxford meeting by those distinguished manufacturers the Messrs. Ransome. Notwithstanding the encouragement thus afforded to further inquiry, it was necessary in the first instance to procure a better instrument than the dynamometer then employed, the same of which a figure is given in the last number of our Journal, p. 143, for the hand on the dial-plate moved so rapidly to and fro, in consequence of inequalities in the motion of the plough or of the horses (if the draft, for instance, was 2 cwt., the hand travelled faster than the eye could follow it between 1 and 3) that we could only judge the draught by observing the extreme points between which the hand varied, and any accurate observation of small differences was out of the question. I found, from Mr. Cottam, of the firm of Messrs. Cottam and Hallen, London, that this vibration was a difficulty which he had long wished in vain to surmount: but he at length suggested a mode of correcting the defect, which I am glad to say I have found completely successful in using the new draught-gauge which he made for me on that principle.

Before commencing the new trials I acquainted Messrs. Ran-

IMPROVED SCOTCH SWING-PLOUGH. FROM LORD MORETON'S EXAMPLE-FARM.



some that I had found in my own neighbourhood a plough of lighter draught than any of theirs in my possession; and they sent me two others, marked FF, precisely the same in all their parts with each other, excepting that one was a swing-plough and the other on wheels. Mr. Allan Ransome was so good as to assist me himself in a trial between his ploughs and Hart's, in which the numbers stood thus:—

	Cwt.		Stone.
Hart's	$1\frac{7}{8}$	*equal to*	15
FF, swing . . .	3	. . .	24
Rutland, NL . .	$3\frac{3}{4}$	. . .	30

Although these numbers were taken by an instrument which I think very imperfect, and were probably one stone too high, they give, I suppose, a fair comparative estimate of the draught of the ploughs as they then were: but it was suggested by a member of our Society, Mr. Harris, of Hinton, that Mr. Ransome's ploughs were rendered much heavier in draught by the coat of coal-tar with which their iron mould-boards had been covered, according to the practice of many makers of implements; and he undertook to polish their iron-work by using them in a gritty soil for two or three days before the final trial took place.

An opportunity was afforded me of adding to the implements to be tried two improved Scotch swing-ploughs, which Lord Moreton had lately imported from Scotland for his example-farm at Whitfield, in Gloucestershire. The gentleman who superintends that farm also offered to send up a pair of Clydesdale horses and a Scotch ploughman, and I was particularly glad to accept Mr. Morton's offer, because a fair trial was thus insured to these ploughs, of which Mr. Loudon says, in his 'Encyclopædia of Agriculture'—"There are now a great variety of ploughs, the best of which, for general purposes, is universally allowed to be what is called in England the Scotch plough, and in Scotland the improved Scotch plough:" and, in another place, "Of swing-ploughs, by far the best is the implement known in England as the Scotch plough." Mr. Morton was desirous also of showing what two good horses are capable of effecting upon heavy land.

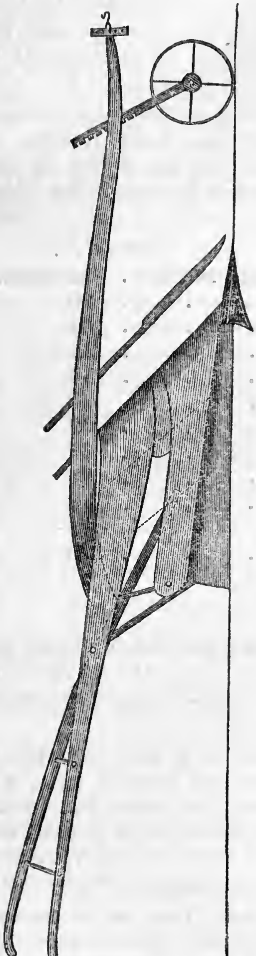
The points of inquiry, then, towards which I was desirous of directing our trials were chiefly these:—

I. The comparative lightness in draught of wheel and swing-ploughs.
II. The lightest plough absolutely of whatever kind.
III. The effect of different soils upon the qualities, and chiefly on the draught, of the plough.
IV. The comparative tenacity of different soils; of which there is much variety in this neighbourhood.
V. The power of two horses to plough the strongest soil.

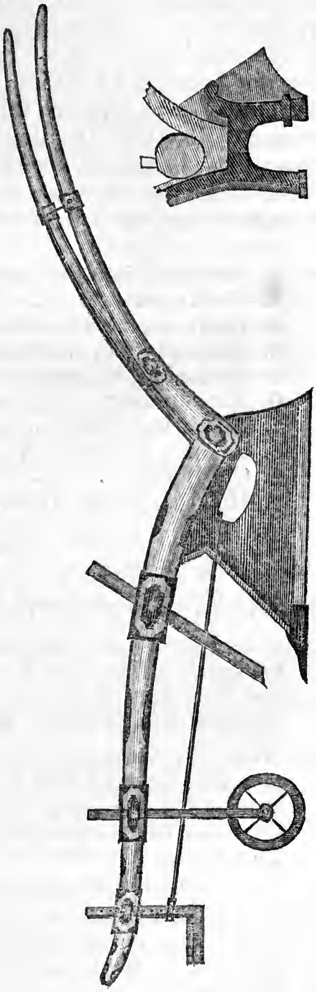
The ploughs put into the ground were as follow:—

1. An improved Scotch swing-plough, made by Mr. Ferguson, near Stirling, entirely of iron.
2. Another, by Mr. Clark, also near Stirling. These two were both remarkable for elegance of shape and general air of lightness.
3. A one-wheeled plough, of wood with iron breast, by Mr. Hart, of Wantage. The mould-board is not, as usual, of one piece, but consists of a turnfurrow, standing some inches from the ground, which piece, instead of being gently hollow, is almost flat and straight, and of a separate piece, called a ground-rest, which lies below and within the former, and serves to clear out the bottom of the furrow. This is our old construction in this part of the country, and this plough may be called an improved Berkshire plough.
4. Ransome's FF, with two low wheels, resembling his Rutland plough (a figure of which is given in Mr. Handley's paper), but of slighter proportions. This plough was originally constructed by him, in the year 1826, for market gardeners near London, to be drawn with one horse, but is now used as a two-horse plough on light lands in Cambridgeshire.
5. Ransome's FF; the same plough, but as a swing-plough.
6. A swing-plough, with wooden breast of the Berkshire construction, made by Mr. King, of Buckland; belonging to Mr. Throckmorton, and held by his ploughman, who had won a prize at our Faringdon Meeting.
7. A one-wheeled plough, of the same general shape, but much heavier, belonging to Mr. Williams, of Buckland. This plough, and the holder also, had lately won a prize at our local meeting.
8. The Rutland plough of Messrs. Ransome, which shows the lightest draught in Mr. Handley's paper.
9. An old Berkshire plough, of a very cumbrous appearance, with an extremely high gallows in front, entirely of wood.
10. Having since received a plough which came from Lord Leicester's agent, and which I am informed is the implement used on the Holkham property, I tried it upon this field, the ground remaining in the same state. It is a two-wheeled plough, with a light gallows.

I will now give the successive trials, only observing that, in any remarks on the performance of the ploughs, I am stating not my own opinion, but those of several practical agriculturists who were good enough to assist me. With regard to the numbers indicating the draught of the ploughs, I was also aided by other observers; and such is the goodness of Mr. Cottam's new draught-gauge, that we scarcely ever, I believe, differed by more than a quarter of a hundred-weight, and often agreed to an eighth, or one stone. The numbers are therefore given in stones, as a well-known measure of the weights imposed on a horse.



KING'S WOODEN PLOUGH.



HART'S PLOUGH.

Section of Open-tail Iron.

Trial I.—*Nov. 6th.*

The field is a sandy loam, free in working when wet, as it now was; but, notwithstanding its lightness, a little adhesive of its kind, situated on the stone brash, as it is here called, though properly the coral rag; a clean wheat-stubble. The depth of the furrow was 5 inches by 9 wide; and these dimensions were carefully adhered to, as a person followed each plough in succession, measuring with a rule the depth and width of the furrow, and stopping the ploughman whenever there was any defect in these respects. The ploughs were drawn by two horses. The following numbers were noted down:—

		Furrow 5×9.
1.	Ferguson's improved Scotch swing-plough	19 stone.
2.	Clark's ditto	20
3.	Hart's improved Berkshire, one wheel	14
4.	Ransome's FF, two wheels	14
5.	Ransome's FF, swing	18
6.	King's swing	18
7.	King's one-wheel	17
8.	Rutland, Ransome's NL, two-wheels	17
9.	Old Berks	23
10.	Holkham plough, two-wheels	18
	Average	$17\frac{4}{5}$

On this trial we may observe,—

1st. What I found, with some surprise, that the Scotch ploughs were the heaviest in the field for the horses, except the old Berkshire, and more than 35 per cent. worse for them than the two lightest ploughs, which were Nos. 3 and 4.

2nd. That FF, which, on the same spot of ground, and with the ground in the same state of moisture, had been 24 stone, or 23 stone, allowance being made for the other draught-gauge then used, now that its mould-board was cleaned, drew 18 stone only. This appears to show the importance of preserving the plough-irons from being honeycombed, as we often see them, by rust.

3rd. Ransome's FF, as a swing-plough, was 4 stone, or 28 per cent., heavier than the same plough with its wheels on—a strong confirmation of Mr. Handley's opinion upon the subject; and it then equalled in lightness the plough of Hart's, with which it was sent to compete. King's plough worked better, by one stone only, with the wheel than without: but it must be remembered that it is a heavier plough.

4th. Putting the old Berkshire aside, the four easiest ploughs of the remaining eight were four distinct wheel-ploughs; and the four severest for the horses were four swing-ploughs.

5th. If we once more compare the two ploughs in daily use on this very soil, we find Hart's at 14 stone, and the old Berkshire at 23 stone: that is to say, worse by 2 stone for its three horses than Hart's for its two.

On land of this quality the Scotch swing-ploughs were evidently out of the question: at the invitation, therefore, of my neighbour and friend Mr. Throckmorton, we adjourned to some low strong ground of his near the Thames, in the parish of Buckland, partly with the view of trying the powers of the Scotch horses, and of ascertaining whether, as some suppose, there is no ground which two horses are unable to cope with.

Trial II.

This land was a clean bean-stubble, productive in dry seasons, a dark mould on a subsoil of blue clay. As it was laid up in high ridges, and the occupier stated that it varied in firmness, being easiest to work near the furrow where it was wet, we had some difficulty in finding a sufficient breadth of equal strength for the trial of the nine ploughs. We chose, however, the drier part of a land, and were permitted to throw the furrow-slice down from the ridge, instead of gathering it up to the crown, as we ought to have done in that stage of the cultivation: but to have done so, we were told, would have been the labour of another horse. At the desire of the very intelligent Scotch ploughman we went an inch deeper than in the last trial, making the furrow 6 inches by 9; that is, 6 inches on the land-side, for the ridge was so steep that there may have been an inch less of depth on the other side of the furrow. The Clydesdale horses behaved admirably, but it was soon evident that the attempt was a vain one. They struggled and floundered; and the other two pairs which succeeded them were much distressed, particularly the horses who were not in the furrow. The ploughmen could scarcely keep their ploughs in the ground. It became difficult, under these circumstances, to form a fair average of the respective numbers shown by the instrument, but the following Table contains the best approach we could make:—

Blue Clay in the parish of Buckland.

	Furrow 6 × 9 inches.
Ferguson's improved Scotch plough, swing .	50 stone.
Clark's ditto	52
Hart's one wheel	43
Ransome's FF, two wheels . . .	44
Ransome's FF, swing	44
King's swing	48
King's one wheel	43
Rutland, Ransome, two wheels . . .	50
Old Berks	52
Average .	$47\frac{1}{3}$

It appears from these numbers that here the Scotch swing-ploughs went backward in proportion to all the others, being, in fact, no better than the old Berkshire. This may perhaps be accounted for by the circumstance that they are made entirely of iron, for the farmers of this land are all of opinion that even iron mould-boards must not be used upon it, because this clay adheres so much more to iron than to wood. At the end of a very short furrow all the ploughs were more or less covered in every part with a thick coat of this very glutinous clay, which belongs to the formation called by geologists the "Oxford, or blue clay." It will be seen that in the FF, as a wheel or as a swing-plough, there was no perceptible difference; but no inference can be drawn from this circumstance as to the general question, because its very small wheels were completely clogged with the clay, and resembled two large balls of earth. The same was the case with the Rutland plough. I must mention, in order to show the errors which may arise in such trials from inequalities in the firmness of the ground, that this plough being placed in the low part of a second land the draught-gauge stood at 44 stone only, but rose to 50 when we returned to the top of the ridge, which was drier and more trampled. The two other ploughs, which are marked as the lightest, had each of them one wheel only, which ran of course on the unploughed ground.

The superiority of one plough over another was here much less than on the lighter ground, the difference in the first trial between the highest and lowest draught being in the proportion of 1 to $2\frac{1}{2}$, whilst in this very clogging land the distinction is not so much as between 4 for the easiest and 5 for the heaviest plough —I mean, of course, heaviest in draught.

There is one point only on which I consider this trial to be conclusive, that is, against those who maintain that there is absolutely no soil which may not be tilled by a two-horse plough. Here the ground was stated by the occupier to be in the most favourable state for working; it was a perfectly clean bean-stubble: we departed from the right course of management by throwing the furrow-slice downwards instead of upwards, yet the ploughmen, three of them accustomed to the land, were unable from the struggling of the cattle to keep their ploughs level; and as for the horses, it was almost cruel to make them turn the few short furrows required, though the three pair were put in by turns, and they did not go two hundred yards without resting; at a depth, too, not exceeding six inches.* It is true that we were two inches below

* I have myself witnessed the same fact on a clay-land farm in the low lands of Surrey, where as fine a pair of cart-horses, of the Lincoln breed, as were ever whipped, worked in a Scotch swing-plough, held by a

the usual depth of cultivation, and I had thought that this might be some disadvantage to the ploughs, but I am informed that, on the contrary, the solid subsoil when brought up tends to remedy the disposition of this soil to roll onward before the plough, instead of falling regularly on the side. This field is as I have mentioned on the Oxford clay formation, which extends in a narrow belt from about Crewkerne, in Dorsetshire, by Frome, Malmesbury, Oxford (whence it takes its name), Bicester, Newport Pagnell, running near Bedford, where it becomes wider, and occupies a large space, with Peterborough at its northern end, Huntingdon and Higham Ferrers on its eastern and western borders, appearing again afterwards about Market Deeping, and extending due north by Lincoln, up the Humber.

If this field be a fair specimen of the toughness of the Oxford clay, we may safely say that, except where it is covered with gravel, the two-horse plough is inapplicable within that district: if it be not, it is desirable to know in what parts of its range this very obstinate clay becomes freer.

It may be remarked that, if we take the average draught of all the ploughs in each of these trials, we shall find that it was about 18 stone in the first, and in the second 47, much more than double. This variation is within a space of two miles. Horses and men having now had enough to do, returned home.

Trial III.—*Nov. 7.*

It has been mentioned that one main distinction in the trial ploughs lay in the shape of the breast which moves the earth towards the side, that of the Scotch ploughs and of Messrs. Ransome being a gentle hollow curve, founded on those mathematical principles which were applied by Mr. Jefferson, President of the United States, in his paper on the true shape of the mould-board, addressed to the French Institute—and, before Mr. Jefferson, by an English ploughwright, at Rotherham, in Yorkshire—and that of the four Berkshire ploughs being full, straight, and short, not raising the mould gradually like a wave, but throwing it over at once. As it is generally stated that the hollow form of the breast is most adapted to sandy ground, I determined on this day,

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very experienced ploughman from the Lothians, could not, in such weather, make any impression on the soil. A third was added, but the team, after struggling for a short distance, was at length brought to a dead standstill; and the land, which was a wheat stubble, was afterwards broken up with a Kentish turn-wrest, drawn by five horses in line. They, however, did the work well; but I am persuaded that no swing-plough could have been made to keep an even furrow in such a soil, in the condition stated.—F. Burke.

in order to give the Scotch ploughs their fair advantage, to try them on the most sandy land that could be found; and we selected a very free brown loamy sand of good quality, without stone, gravel, or clod, resting on a pure yellow sand (it was then a clean wheat-stubble), in the parish of Hatford, on the coral rag formation. As in consequence of bad weather we were unable to make more than one trial, we enlarged that one by making each plough turn four furrows, at the depth of 4, 5, 6, and 7 inches respectively. The following Table gives the numbers shown by the draught-gauge:—

	Inch.	Inch.	Inch.	Inch.
Furrow	4×9	5×9	6×9	7×9.
1. Ferguson's improved Scotch plough, swing	18	19	19	22
2. Clark's ditto	17	17	18	21
3. Hart's improved Berks one-wheeled .	11	12	16	18
4. FF, Ransome's two-wheeled . .	12	13	18	21
5. FF, Ransome's swing . . .	16	16	18	21
6. King's swing	15	15	18	20
7. King's one-wheel	16	17	21	23
8. Rutland NL, two-wheel . . .	16	16	18	20
9. Old Berks	21	21	24	31
Average . .	$15\frac{7}{9}$	$16\frac{2}{9}$	$18\frac{8}{9}$	$21\frac{8}{9}$

The Scotch ploughs, notwithstanding their hollow breast, appear still to great disadvantage in the 4-inch furrow, and also in the 5-inch one, (the usual depth of ploughing upon this ground,) whether compared with King's swing-plough or with Hart's wheeled one. The latter plough on this land might be drawn by one strong horse; it still maintains a slight superiority over its competitor, FF, with wheels, and the latter again a considerable one, 25 per cent., over its duplicate as a swing-plough, excepting at the lower depths, where the wheels, from the lowness of the beam, had not room to turn. At the greater depths, however, of 6 and 7 inches, all the ploughs, excepting the old Berkshire, approach each other more nearly, which agrees with what we found yesterday on the heavy ground, that, where the resistance of the soil is much increased, the qualities of the plough benefit the horses in a slighter degree. It will be observed that the same numbers sometimes appear in two columns for the same plough, though the furrows are of different depths. This must arise from some inequality in the firmness of the land, which it is very difficult to avoid in selecting the ground. It should be remarked that the Scotch ploughs increase very little in draught as they go deeper; indeed, these ploughs appeared throughout to most advantage when they were low in the ground. The Rutland alone resembles them in this respect on the present trial. The old Berkshire shows, on the

other hand, a singular want of pliancy for adapting itself to deep ploughing.

It will be seen by this table that on sandy land, at least, the draught increases but slowly when the furrow is deepened. As this is an important point in the practice of husbandry, and as it is laid down, on the contrary, in our books that the draught increases rapidly, or, in mathematical terms, according to the squares of the depth,—that is to say, that if the draught at 4 inches be 18 stone, at 7 inches, it will be as 49 to 16 or 54 stone, I put the question again to the test two days later, upon a poor moory soil, with Ferguson's Scotch plough. We began with a 5-inch furrow, and went lower each furrow until the plough was a foot in the ground. The increase of draught was as follows:—

Furrow 9 inches wide. Depth in Inches.	Draught in Stones.
5	23
6	22
7	25
8	30
9	31
10	40
11	50
12	50

This is a difficult experiment to make, and some of the numbers show that we did not succeed always in keeping the proper depth of our furrow. Still they are near enough to prove that the law of increase laid down in books is altogether erroneous; since, if that were the true rate, the draught at a foot would have been not 50 stone, but 132.

To return, however, to the table which contains the numbers marked in our third trial, no inference can be drawn from it as to the right shape of the plough's breast, hollow or full, for sandy land; but, as a proceeding adopted on the next day seems to throw some light on this point, I will mention it here. It occurred to me that there might be a considerable difference in the draught of the plough, independent of the ease with which it severed the ground and threw over the furrow-slice. I accordingly desired each ploughman after ploughing the trial-furrow to pass over a certain space of unploughed ground, when the draught was taken down from the draught-gauge, and the same thing was done on another day by passing the plough along the empty furrow. The draughts of the wheel-ploughs are given below from the first trial as the fairest for them; those of the swing-ploughs were the same in both cases. I add the weight of the ploughs, taken as nearly as I was able to estimate it with the means in my power.

	Surface Draught, in Stones.	Weight of Plough, in Stones.
1. Ferguson's swing	12	15
2. Clark's swing	12	15
3. Hart's wheel	3	12
4. FF, wheel	8	13½
5. FF, swing	10	10½
6. King's swing	8	8
7. King's wheel	6	10
8. Old Berks wheel	8	
9. Rutland, wheel	8	15

The first thing which struck me in the numbers of the first column is the very large proportion of labour which the mere dragging of the implement bears to the whole task of the horse. The entire labour incurred by a pair of horses in making a 5-inch furrow on the sandy land of this day's trial, with Clark's Scotch plough, is 17 stone; and since 12 stone of these are given, as we see, to the plough itself, 5 stone only can be required for cleaving and turning over the soil, the real object to be performed. It is a striking fact, that, upon such land, it costs the horses as much labour to move the Scotch iron swing-ploughs along the surface as to plough the ground at 5 inches with Hart's one-wheeled plough, namely, 12 stone in both cases. At 4 inches Hart's plough working draws but 11 stone.

But further—since, if we deduct the surface-draught of a plough from its draught when at work, the remainder represents the power which it causes the horse to expend in moving a given portion of soil—it appears that by making this calculation for several ploughs we should be able to compare the merits of those parts of them which act on the land. I took, therefore, the draughts of the ploughs in cutting a 5-inch furrow on the sandy field at Hatford, and subtracted from each their surface-draughts respectively :—

	Gross Draught in Furrow 5 × 9.	Surface Draught which is to be deducted.	Remainder or working Draught.
1. Ferguson's	19	12	7
2. Clark's	17	12	5
3. Hart's	12	3	9
4. FF, wheel	13	8	5
5. FF	16	10	6
6. King's swing	15	8	7
7. King's wheel	17	5	12
8. Rutland	16	8	8
9. Old Berkshire	21	8	13

Here the situation of the Scotch ploughs and of Hart's is strikingly changed. When at work the two former were half as heavy again as the latter: it now appears, however, that this great

disadvantage arises not from their concave mould-board, or from any defect in the shape of their cutting parts (on the contrary, upon sand they produce the same effect with a power of 7 or of 5 stone as Hart's does with a power of 9 stone), but from some cause which makes their own weight tell heavily on the draught. It appears, too, that the four easiest ploughs in this point of view have hollow breasts, the four heaviest full breasts. Still it must not be forgotten that the trial is on sand, to which the hollow breast is considered to be most adapted. It appears, too, that of the two competitors, Hart's and Ransome's wheeled ploughs, one is singularly easy above ground, and the other below, so that a lighter plough than either for light ground might possibly be formed by combining their peculiar merits. I must add, however, that, although the principle of this calculation generally is simple enough, I am not confident in the details which I have given, because, in repeating the trials as to the surface-draughts of two or three ploughs, they varied much according to the nature of the surface, and also because, excellent as is Mr. Cottam's new draught-gauge, I am not sure that it is quite correct before it reaches 8 stone, or 1 hundred-weight.

Trial IV.—*Nov.* 8.

Although the pair of Scotch horses, and, still more, the other pairs, had been defeated, on the first day, by the heavy clay, it was fair to afford them another trial with stiff land of a less obstinate kind than that with which they had then endeavoured to cope. It had been also the principal object of Mr. Morton to prove to two farmers in the neighbourhood that their strong ground, which was usually worked with four horses, might be ploughed by two only. The first field, therefore, which we entered on was a deep strong loam, in the parish of Charney, very good for all kinds of crops, resting upon yellow clay, at that time a clean bean-stubble. It offered great resistance to the plough, as the following numbers show. The furrow was 5 inches by 9.

	Furrow 5×9
1. Ferguson's swing	35
2. Clark's swing	33
3. Hart's one-wheeled	23
4. FF, with wheels	33
5. FF, swing	30
6. King's swing	27
7. King's wheel	30
8. Old Berks	36
9. Rutland, NL	36
Average	$31\frac{4}{9}$ stones.

The superiority of Hart's one-wheeled plough, in lightness of draught, over the two Scotch ploughs, and indeed, more or less, over all the others, continued, it will be seen, as before. That of the FF, with wheels, over the same plough as a swing, did not continue, but was reversed: the cause appeared to be, that both its wheels were clogged with dirt, the land-wheel, though on a tolerably firm surface, through its small size; the furrow-wheel, though of course larger, from collecting the loose dirt in the furrow. The same causes affected the Rutland plough, and I suppose King's also, but I omitted to observe this plough at the time. Hart's was exempted by its single wheel, of a better size, running on the unploughed surface, The Scotch horses worked without signs of distress on this ground. We next proceeded to a field which had been selected by the occupier, a member of our Society, Mr. Brooks, of Lyford, as being peculiarly calculated to try the powers of the pair of Scotch horses.

Trial V.

Much interest was attached to this trial, and several neighbouring farmers had come to witness it. The surface of the soil is more a clay than a loam, of moderate fertility, resting on a decided clay, known to geologists as the Kimmeridge clay. We found in the field four strong horses at work in line according to the general practice, drawing an old Berkshire plough, and having evidently enough, though not too much, to do. The draught-guage when applied showed that in a 5-inch furrow they were exerting a power of 4 cwt., or 32 stone, and in one of 6 inches, 2 stone more, 34 stone.

	Furrow 5 × 9	6 × 9
Old Berks	32	34

The next plough tried was Ferguson's, with its two horses, which showed a draught of 3 cwt. only in the 5-inch furrow, exactly one horse less. The state of the land, which was extremely wet from heavy rains, was very disadvantageous to the pair of horses, since, though the ground was easier for the plough, it was in a greater proportion difficult for the horse who was upon the unploughed land, into which he sank four inches at every step. One clear result, however, appeared already, that even if 2 horses abreast were not enough, 3 horses in line with Ferguson's plough would have exactly the same work to do as the 4 horses whom we found drawing the old Berkshire plough.

	5 × 9	6 × 9
Ferguson	24	26
Clark	27	30
Hart	30	28
FF, swing	24	26

Here it will be seen that Hart's plough, for the first time, lost its advantage. The fact is, however, that unless to carry out all the trials with all the ploughs, we should not have worked it at all, as the surface was so very soft, that the wheel instead of governing the depth of the plough's action, sank itself, and dragged through the soil like a coulter. Unfortunately, it did not occur to me that this wheel might be taken off and the implement be tried as a swing-plough. The FF plough with wheels was put into the ground, but, for the same reason, it would not go at all. It was now suggested by the practical farmers that the unploughed ground having been trampled by the land-horse, (for the question with them was not so much the comparative lightness of the different ploughs, as the possibility of employing 2 horses abreast instead of 4 in line,) the draught of the Scotch plough would probably be increased beyond the fair exertions of its horses. Ferguson's plough was accordingly put in again, and their expectations turned out to be so far correct, that its draught did stand much higher.

	5 × 9	6 × 9
Ferguson's, on trodden ground .	31 .	33
King's wheel . . .	35 .	33
King's swing . . .	24 .	27

This last plough, however, it will be seen, worked at as low a power on the trodden land as Ferguson's in its first trial on the fresh ground; but it had been besides objected to the Scotch ploughs that their furrow was shallower by an inch on the right hand than on the left. Now, the furrow drawn by King's plough was declared to be far the best which had been yet made, and indeed I could myself perceive that it was perfectly flat, clean, and square. The plough was considered by the occupier of the land as particularly well suited for its cultivation, and it should be remembered that its draught is to that of the implement hitherto used as that of 3 horses to 4. It has the open mould-board, as it is here called, or turn-furrow and land-rest which have been already described; the turn-furrow is flat, and both parts are not of iron, but of wood. The Rutland plough followed, and was also allowed to make an excellent furrow: its draught indeed was greater, but the wheels were too much clogged for a fair trial, and it was thought that in drier weather it might be a very good plough for this land.* Ferguson's was put in once more, and was rather lighter than on its second trial.

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* A Rutland plough has since been employed regularly on this farm, and is preferred by the occupier to any plough he has tried, on account of the excellence of its work.—PH. P.

SUMMARY OF TRIAL.

	5 inches.	6 inches
Old Berks	32	34
Ferguson's	24	26
Clark's	27	30
Hart's	30	28
FF, swing	24	26
Ferguson's (2nd trial, ground trampled)	31	33
King's wheel	35	33
King's swing	24	27
Rutland	29	31
Ferguson's (3rd trial)	28	27 *
Average	$28\frac{2}{5}$	$29\frac{1}{2}$

The Clydesdale horses were greatly admired by all who saw them at work. They unite power and bone with the elastic action of a blood-horse: they stepped regularly together, and were guided by the ploughman, by the voice, almost without the use of the reins. It was generally admitted that no such horses had been seen in our part of the country; and the excellence of the ploughman was, I think, admitted to be equally great. I think I may add that, in the opinion of the bystanders, this land, usually worked with four good horses in line, might be ploughed by two such horses, in such condition, abreast; though, it was said, that it would cost as much to keep the two horses in that condition as to support the four in their usual working state. I am the more induced to think that they would be equal to the undertaking, because the ploughman assured us that it was exactly such land as this, and no other, to which he had been accustomed in Scotland, there called carse-land, and had ploughed always with two horses: he said, indeed, that it was there rendered somewhat lighter by being thoroughly drained. The only doubt arose from the softness of the unploughed land on which one horse had to walk. As to the draught, it was less than in the last trial, though the land was a more decided clay; and on that ground where the land-horse had a firm footing, the pair had worked apparently with perfect ease.

TRIAL VI.—*Nov. 9th.*

Our last trial was made on a very poor damp moory soil, which I selected as being perhaps the kind of ground on which the

* It may be observed that, in several instances, a lighter draught is marked in the second column than in the first. The occupier, Mr. Brooks, accounted for this variation by the circumstance that the deeper furrow was on the north, and the shallower on the south side of the ridge, or land; the north side being, as he stated, always rendered lighter to plough by the stronger action of the frost upon it in winter.—PH. P.

Scotch ploughs might excel. It was rather retentive of surface water, though crumbling even in its present state. In summer, when tilled, it falls to powder. It was a grass ley, but the roots of the herbage could offer little resistance to the plough, as the greater part had been thrown out of the ground in previous winters, and the surface was more than half bare. The numbers were as follow :—

	5 inches.	6 inches.
Ferguson's swing	23	22
Clark's swing	23	22
Hart's one-wheel	16	18
FF two-wheel	14	16
FF swing	21	23
King's swing	19	20
King's wheel	18	19
Rutland two-wheel	21	22
Old Berks	25	28
Average	20	$20\frac{7}{9}$

It will be seen that the Scotch ploughs did no better here than elsewhere; in fact, they did worse, since they were heavier than all the other ploughs brought into competition, the old Berkshire being out of the question. They were half as heavy again in their draught as the two lightest ploughs. The numbers also show that, in this instance only, Hart's plough was beaten by its competitor FF, with wheels; which last I am bound to admit, after a repeated trial, was, on this particular soil, better by two stone than Hart's. It will be seen how much this plough lost here, where the surface was firm, on being worked without wheels, its draught rising from 14 stone to 21; that is, being increased by exactly one-half. King's wheel-plough, for the same reason, beat his swing-plough, at both depths, though to a much smaller extent.

Although there are several other varieties of soil in this neighbourhood which I should have been glad to have tried, yet, as I could no longer detain the Clydesdale horses and Scotch ploughs, I was obliged here to close the comparative trials. They are limited in many respects: first, as to the number of the ploughs; secondly, the kinds of the soil; thirdly, the state of the soil, which was throughout very wet (it would be, of course, desirable to try each soil in a state of wetness, of moderate moisture, and dryness); fourthly, they were all but the last on clean ground; and, finally, they were first ploughings only; but it would be also well to know the draught of ploughs in other stages of cultivation. So far as they go, however, they appear to lead to these inferences:—

1. With regard to the question of wheel and swing plough,

wherever the soil is firm enough to bear up the wheels, they appear to me to be advantageous: the best plough, therefore, will be one, the wheels of which can be taken off or put on, according to the state of the ground; and as, where there is one wheel only, it will be on the unploughed ground, where it will be less likely to become clogged, one wheel only is probably better than two.

2. It may be fairly said that the lightest plough in these trials was Hart's, though Ransome's FF ran it exceedingly near, and beat it in the last trial. The best and lightest plough on a wet clay was King's swing, with a wooden mould-board. Hart's plough on our lighter land goes as easily with 2 horses, and King's on wet clay with 3 horses, as our old Berkshire, with 3 horses on the former ground, and with 4 on the latter. These 2 ploughs have the open mould-board, but how far that contributes to their excellence I cannot discover. Ransome's Rutland plough appears to be a very good implement, the Scotch swing-plough to be the heaviest of all the modern ploughs which were tried, not to make a clean furrow, to be out of the question upon any light soil, and to be by no means the best upon a heavy one.

3. As to the effect of different soils upon the working qualities of the ploughs, the trials were too limited, and my own inexperience too great, for me to offer any opinion upon this point.

4. With regard to the different tenacity of soils, the following Table contains the average draught of all the ploughs on each of the different fields:—

		Average Draught at 5 inches by 9.	Geological Situation.
Trial	1. Sandy loam	$17\frac{4}{5}$ stone	Coral rag.
,,	2. Clay loam	$47\frac{1}{3}$* ,,	Oxford clay.
,,	3. Loamy sand	$16\frac{2}{9}$,,	Coral rag.
,,	4. Strong loam	$31\frac{4}{9}$,,	Kimmeridge clay.
,,	5. Clay loam	$28\frac{2}{5}$,,	Kimmeridge clay.
,,	6. Moory soil	20 ,,	Alluvial gravel.

The coral rag shows a tenacity of 17 stone only, while the Kimmeridge clay on its south stands at 30, and the Oxford clay on its north at 47. It is on the middle band, however, of the upper oolite that the trials were made; on either edge where it approaches the clay formations it becomes tougher. The most remarkable point, however, seems to me to be the difference between the two districts of clay, one of them being worse by one-half to work than the other, although there is no observable distinction in their general appearance.

* This furrow was 6 inches deep on one side, but the furrow-slice was thrown downwards.

There remains one other question to which our trials were directed—the extent to which the two-horse plough can be made use of in husbandry. As far as regards light loams, the answer in the district where the trials were made is easy: the horses have been hitherto harnessed two abreast, with a leader in front to a heavy plough. It appears that we have a plough one-third lighter in draught than the old implement. The only change required is to adopt that plough, to remove the leader, and to place reins in the hands of the ploughman: this change has been gradually spreading among our farmers for some time, and of late so rapidly, that on such soils it will soon, I hope, become general.

On heavy lands, the answer is by no means so easy, because it appears that there are some of them, one at least, the Oxford clay, beyond the power of two horses; and because here we have to substitute two horses not for three but for four, two horses abreast instead of four in line; so that a greater change is to be made; and on these soils too the more important, because the unploughed land may not be in a state to bear up well one of the pair. It appears, however, that on the Kimmeridge clay (Trial V.) a plough was found which required three horses only in line, where the old plough required four; their respective draughts being 3 and 4 cwt., or 24 and 32 stone. The question then which remains, is, whether two horses abreast can, on this land, be made to do the work not of four but of three horses in line. As it is a question of interest, I will beg to lay before the Society, as shortly as possible, such information as I have been able to obtain on the subject, after taking all the means in my power. The Scotch ploughman stated, as a general opinion in his own original district, that two horses abreast have as much power over the plough as three horses in line, because their purchase over it is greater in that proportion. Now, though we have no means of bringing this point to any nice measurement, there are grounds, I think, for supposing that the advantage so gained is considerable. The horse appears to be much less capable of exerting his strength in a level direction, that of drawing, than in an upright one, that of carrying. In these trials I sometimes observed that my own horses, rather strong ones, but not in working order, were a little distressed by drawing once up and down a short furrow, at a brisk walk, with a draught of only 24 stone between them. It could not be supposed that a strong cart-horse would feel the weight of a rider of 12 stone, at a walk, for that trifling distance: the pack-horses of Yorkshire used to carry, I find, loads of 30 stone for a day's journey over the highest hills of the north. It is well known too, that, with ourselves, much depends on the direction in which we exert our muscles. I believe that a man can put forth, without greater fatigue, three times more of his strength in row-

ing a boat than in towing it from the bank. The nearer th horse is brought to the plough, the more he will draw upwards, and the more of this advantage, whatever it be, he will obtain. The two horses are in general brought as near to it as is consistent with the freedom of their hind legs. There is, however, in the Scotch harness, a contrivance by which the line of draught is shortened still more, and to which Mr. Morton justly, I think, attaches much importance. In this neighbourhood, the trace of the horses is not supported on their back, but passes in a straight line from the point of their shoulders to the beam of the plough: so that they draw, of course, from the shoulder. I do not know whether this is general; but it is certainly figured so in many works on agriculture where this question of draught is treated; and treated, I must say, most inconclusively. But, in the harness of these Clydesdale horses, who worked here so admirably, there was a back-band of strong leather, 3½ inches wide, moveable along the back of the animal to different points, which carries the traces level from the collar; so that the line of draught is shortened considerably, and the horses work at the same time from the back with an uplifting power, and from the shoulders with an advancing power. The advantage thus given may, I think, be very considerable; indeed, no one will regard the direction of a horse's exertions as a slight matter, who recollects that extreme case in which, as Sir David Brewster informs us, a strong man discovered that, by placing himself in a certain posture, he could withstand the efforts of two horses pulling against him.

But there is even another circumstance which may render a short draught advantageous in ploughing, and I will merely mention it in the hope of drawing the attention of mechanicians to a subject on which I must say I have not found in books anything satisfactory: I mean, that an uplifting draught may be best suited to the force which it is the object of the plough to exert. For that force is an uplifting one, as regards the earth to be raised, as well as an advancing one, as regards the progress to be made by the plough itself along the furrow. It appeared, too, in Trial II., that the friction arising from the plough's own weight occasions a large part of the force which the horse has to expend; but the more the horse draws upward, the less of course will the plough press on the ground. I leave this point, however, to be considered by those who are able to discuss it on mathematical principles, and return to the immediate question, how far two horses abreast can, with the same plough, do the work, on strong land, of three harnessed in line.

The two Clydesdale horses were, I think, able, at Lyford, with as little exertion, to draw King's wooden swing-plough, which showed a draught of 24 stone, as were three horses of

about equal substance in line. But, whatever advantage they may have gained from being both next to the plough, or from their back, band, I must admit that much is to be attributed to the superiority of their breed, and also of their condition, which was so high that, as has been already mentioned, it was even said the pair must cost as much to keep in that state as the ploughing-team of four, whose place they would have to supply. This question of expence being a most material one for the practical farmer, I requested information of Mr. Morton, as to the cost which Lord Moreton had incurred in the keep of five pair of Clydesdale horses on Whitfield farm, in Gloucestershire; and that gentleman was so good as to supply me with an account of it from the farm books. My friend Lord Moreton's horses certainly appear to be extremely well fed, their allowance being hay and four quarterns and a half of corn each day, of which one-sixth part is beans and the rest oats. I believe that the medium allowance of our horses, on the other hand, is cut chaff, with one bushel of corn weekly. The expense of feeding each horse for the summer half year was 18*l.* or 36*l.* for the year. The expense of a farm-horse in this neighbourhood is reckoned, I believe, at 25*l.* The pair, therefore, at 72*l.* yearly, would be about as expensive as our 3 horses at 75*l.* It is true these Clydesdale horses are worth their keep, for it appeared to me, during the trials, that their fair work was at least a draught of 12 stone, while that of our own is certainly not more than 8, so that the pair equals the three in the work (24 stone) as well as in the expense of their keep: still there is no saving, which is the question we are now considering. There would be a saving in substituting a plough of 3 cwt. for one of 4 cwt., and thus reducing the actual team of four horses to three: there would be no saving, so far as we have yet gone, in substituting the Clydesdale pair for the remaining three, since the expense of keep would be the same for the two horses as for the three.

There is, however, one more point to be considered—the pace of the horses—the most important point, in fact, since it is the same thing with the quantity of work done in a day. It was impossible not to observe the superior quickness of the Clydesdale horses at work, and on inquiring of the Scotch ploughman, I learnt a fact, since confirmed by Mr. Morton, which completely turns the balance of expense as well as power in their favour, namely, that while the work of our ploughing teams is at best three quarters of an acre upon strong ground (and sometimes as much as an acre upon the lightest), the daily task performed by these Scotch horses, upon strong land, is one acre and a quarter; and this quantity, or one acre Scotch, he stated to be the usual

day's work in his native district.* If these numbers be correct, as I have every reason to believe that they are, it is clear that the saving effected by these high-kept nimble horses must be very great; so great, indeed, as almost to make one mistrust the calculation. Still it does appear that since a pair of the Clydesdale breed, kept at the same expense as three of ours, can plough five quarters of an acre where our teams get through three quarters only, three 2-horse ploughs at work on a farm where Clydesdale horses are kept, are equal to five 3-horse ploughs of our own. Nay, if good ploughs be used by the former, and bad by the latter, are equal to five 4-horse ploughs. I am bound to state the facts according to the information conveyed to me, while I fully admit that without further inquiry we cannot be satisfied that we have an accurate view of the matter. I must, however, observe that it is no question of theoretical calculation, but rests upon facts which may easily be ascertained. Do the Clydesdale horses in their own country plough in single pairs, with the Scotch plough, which appears to be a heavy one, land of the same toughness with that which is here usually worked by four horses in line? Could they work that land easily with a good swing-plough, which would require three of our horses in line? Is their daily task on such land one Scotch acre or one and a quarter English, and is the labour performed by our own limited to three quarters of an English acre? If these facts be correct, it follows, of course, that 6 horses so kept are equal to 15 horses that work with a good

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* The following communication has been made to me by a gentleman on whose accuracy I can implicitly rely.—Richmond.

"I have always found an English acre enough for a pair of horses to plough from the 1st of November till about the 1st of March, but after then, when the days are long, and the horses can work ten hours, there is little difficulty in ploughing an acre and a half, which is one-fifth more than a Scotch acre; much, however, depends on the nature of the soil, and also on the size of the field, as a great deal of time is lost in turning when it is small: upon the whole, on *dry land*, a pair of horses will do a Scotch acre during the year. I have consulted Mr. Walker on the subject, who agrees with me in every respect, and says he always does the quantity stated on your Grace's home-farm, at Gordon Castle.

"I may take the liberty of mentioning that the farm I now occupy in Berwickshire consists of 365 acres of arable land, and about 850 acres of rough pasture and moor, and that I have never kept more than four pair of horses, and during the last three years have drained 58 acres of bog and moss land, which is now under cultivation, and that the stones, in some instances, had to be carted about a mile. I may also mention that, when the land is properly prepared, the same number of horses will drill, dung, plough in the dung, and sow turnips on five-and-a-half English acres daily. I have often done more, but this is sufficient for horses to continue at for any length of time. The drill is made with one furrow, and the dung ploughed in with another; this plan is only lately introduced."—Thomas Balmer.

plough, and to 20 that are pulling a bad one. I must add, that Lord Moreton's ploughman thought our own horses would work as well as his own if they were as well fed. I doubt myself whether they are so formed as to walk with ease at the same pace. There is one circumstance, however, which tends to remove what certainly may appear extravagant in this calculation, although the calculation rests upon facts which can easily be disproved if they are incorrect. It arises out of another experiment which I made, and as the results are, I believe, new, and as I think they are curious, I will venture to trouble the Society with a short statement of that experiment in conclusion.

In the beginning of these trials I had imagined that if one plough were drawn more rapidly than another, its apparent draught would be unfairly increased in consequence of its having moved a greater quantity of earth during the time of its trial; and precautions were taken accordingly: it soon appeared, however, that a slight addition of speed did not raise the numbers marked by the draught-gauge. At last, therefore, I determined to ascertain, if possible, what was the actual effect produced by increased speed on the draught of the plough. This was first tried with Clark's plough on the moory ground, described already in the account of the fourth day's trial. The Scotch horses were made to go along the 5 and the 6-inch furrows at the slowest pace to which they could be restrained, not so slow a one, however, as I have lately seen in other horses at the same work. The draught was 24 stone in the 5-inch furrow, and 22 in the 6-inch one, which I suppose was on lighter land. They were next urged to the utmost speed of their walk, more than double their former rate; but though more than a double quantity of land was of course ploughed in the same time, the draught was only raised from 24 to 25 or 26 stone in the one furrow, and from 22 to 23 in the other. The extreme slightness of this increase would have surprised me still more, had I not learnt in the course of these trials how large a portion of the draught of the plough is occasioned by its friction against the soil, how small a part by the splitting, raising, and throwing over a certain weight of earth. Thus, in the trial at Lyford, a bystander pointed out to me that while one of the ploughs was being accidentally drawn down a furrow already opened, such was the adhesion of the clay, that the gauge actually marked as high a draught at that time as turned out afterwards to be the average of the plough's work in the same field. Now, friction is, I believe, often not increased by increased rapidity of motion in the two bodies rubbing against each other. But, in the draught of the plough, we have its own weight pressing against the bottom of the furrow, and that pressure increased by the weight of the furrow-slice, the latter weight not increasing,

whatever the pace may be; we have also the plough rubbing against the earth on the land side, and the furrow-slice rubbing strongly against the mould-board; all these parts of the draught coming under the head of friction which may not be increased by increase of speed. There is indeed the earth to be raised and thrown aside, the labour of which must be increased exactly in the same proportion with the quantity to be so moved; and consequently with the speed. But there is one other part of the force to be exerted by the plough which we must not overlook, the cutting or splitting force of the share and the coulter; for this part of the draught may not only not be increased by increased speed, but may even reasonably be supposed to be diminished; since, in operations of the same nature, we see at once that if a spade or a pickaxe were to be used gently and slowly, much more force would in the end be required than with a brisk effort and a quick tap.

But whatever may be the cause, it is certain that in this first experiment the draught of the ploughs was scarcely raised by doubling the pace of the horses. I determined, therefore, to make a second trial upon different ground, and thinking that this principle might in some degree serve to account for the greater quantity of land which the Scotch horses are able to plough, I requested Mr. Morton to observe the pace of those horses when ploughing at Whitfield. He informed me that they plough at the rate of two miles and three quarters an hour, excluding stoppages, and that in drawing carts singly their walk is at the rate of three miles and a quarter.

In making the experiment I did not choose the ground, but took a team at work among others, with Hart's plough, on a clover ley. The ground certainly appeared unfavourable for speed, as it was an adhesive loam upon stone brash, in so bad a state for working that the polished mould-board was completely encrusted with earth. I measured out, however, 110 yards, or one-sixteenth part of a mile, by the side of the furrow, and observed, with a stop-watch, the time employed in passing over that space. The teams of three horses were going slowly, at a depth of 4 inches only by 9 in width, but I desired the ploughman to pass along the furrow still more slowly, at the usual rate of going upon heavy, and sometimes, I must say, even upon light land in this neighbourhood. At this pace he ploughed the 110 yards in 2 minutes and 40 seconds, being at the rate of $1\frac{1}{2}$ miles in the hour. The draught-gauge marked 23 stone.

I then desired him to return to the pace at which I had found his and the other teams working; he now ploughed the 110 yards in 2 minutes and 25 seconds, being at the improved rate of $1\frac{3}{4}$ miles in the hour. The draught-gauge still marked 23 stone, as before.

I now requested the ploughman who had been employed in all the former trials to work, as nearly as he could guess, at the pace of the Clydesdale horses. He did so, and accomplished the distance in 1 minute and 40 seconds, which is almost exactly $2\frac{3}{4}$ miles an hour; his estimate thus agreeing with Mr. Morton's statement. The draught-guage marked, I should say, 22 stone only; one stone less than before. That it did not mark more than the former draught, 23 stone, I am perfectly certain.

I lastly asked the ploughman to plough the length of 110 yards at the utmost of his horses' walk. They did it in 1 minute and 5 seconds; or at the rate of $3\frac{1}{2}$ miles in the hour. The gauge rose indeed but to 24 stone only.

The following table shows the time which would be required for ploughing an acre, with a furrow 9 nine inches wide, at the different rates of motion, exclusive of stoppages.

Rate of going per hour.	Time required to plough an acre.		Draught of plough.
Miles.	Hrs.	Min.	Stone.
$1\frac{1}{2}$	7	20	23
$1\frac{3}{4}$	6	30	23
$2\frac{3}{4}$	4	0	22
$3\frac{1}{2}$	3	8	24

Here, then, it appears to me we have found the secret of the Scotch horses' superior performance as to quantity of work done. Though they are stepping briskly along at a pace which enables them to work 5 quarters of an acre in one day, while the dragging walk of other horses carries them through 3 quarters of an acre only in the same time, they feel the weight of the plough certainly not more than the others, perhaps even less. Let the horses be lively enough to face their work boldly, and step out well, they get, or rather their master gets, beyond the former 3 quarters, 2 quarters of an acre more ploughed for nothing. It is true that the horses have to walk a greater distance in one case, but this cannot be of much consequence. In ploughing an acre, with the furrow 9 inches wide, the horse has to walk in the furrow 11 miles exactly; if then he plough 3 quarters of an acre in the day, he has to walk $8\frac{1}{4}$ miles only; if 5 quarters, or 1 Scotch acre, he must pass over $13\frac{3}{4}$ miles, but $5\frac{1}{2}$ miles more than before. The increased rate of an animal's exertion has also, of course, a great effect upon the fatigue of its frame where the difference is considerable. But I suppose that each animal has in some degree a natural pace, suited to its conformation, which is most easy to it, and that the quicker rate of $2\frac{3}{4}$ miles in the hour may be as natural to the Clydesdale horse as a more tardy walk to cart-horses of our heavy breeds. Still I do not wish to assert that, under all circum-

stances, it is as easy for a horse to move quickly as slowly with a heavy draught. If he be over-weighted, he will not have sufficient strength to spare for carrying on his own weight with ease, and will naturally flag at his task. In order to move briskly, he ought, I suppose, to feel in some degree master of his work, and be able, if required, to draw something more than his actual load. I ought also to mention, after stating the superior exertions which the horse may be called on to make, that these Clydesdale horses of Lord Moreton's are not only fed in a superior manner, but that their day's work is broken into two portions of time, between which they have rest, and either return home to be fed, or are supplied by means of nose-bags with corn in the field. I believe that the practice of working horses for eight hours together not only adds to their fatigue, but that the absence of food for so long a time must be a much more severe privation to them, as to all animals feeding on grass and seeds only, than it is to carnivorous animals and to ourselves.

I will conclude by expressing the hope that others may also be induced to carry on this investigation commenced by Mr. Handley; and that, by the use of the draught-gauge on the part of agriculturists examining the ploughs they employ, and on that of manufacturers endeavouring to improve those which they make, as well as by the employment of that instrument in promoting competition among ploughwrights at our public ploughing-matches, we may gradually save that great waste of horses' strength and farmers' means which hitherto has annually taken place in many of our arable districts. Perhaps, too, when we have got a standard plough, we may employ the draught-gauge in the classification of soils, to register their different degrees of tenacity.

Pusey, *November* 27, 1839.

XXII.—*Results of Experiments in Subsoil-Ploughing and Potatoe-Planting.*—By the Right Hon. Sir James R. G. Graham, Bart., M.P., F.R.S.

To the Secretary of the English Agricultural Society.

Sir,

In a communication which I addressed to you in January last, I mentioned a field of 8 acres of poor and wet land, underdrained with tiles, one-half of which I had trench-ploughed to the depth of 10 inches by two ploughs following in succession; the other half of which I ploughed with Mr. Smith's subsoil-plough, following a common plough, to the depth of 15 inches.

In every other respect this field received the same manage-

ment throughout. I stated that the crop of potatoes yielded 12 tons per acre, and was nearly equal in both parts of the field; but that, in the course of winter, the part where Mr. Smith's plough had been used appeared to me to lie more dry, and to be more mellow.

In spring this field was sown with oats and grass-seeds, by the tenant, under the superintendence of my agent. The quantity of seed sown per acre, and the general treatment of the whole field, were the same. The summer has been unusually wet; yet the crop was excellent, and the grass-seeds are most promising.

One quarter of an acre was accurately measured off on that part of the field where Mr. Smith's subsoil-plough had been used: the produce was thrashed separately by hand, and yielded 13 imperial bushels; equal to 6 quarters 4 bushels to the statute acre.

Another quarter of an acre was measured off on that portion of the field where trench-ploughing had been used, and where the subsoil had been brought to the top. This quarter of an acre yielded 11 imperial bushels of oats; equal to 5 quarters 4 bushels to the statute acre.

Thus the measure of the corn produced by the land where Mr. Smith's plough was used is one-sixth more than the produce of the land which was trench-ploughed.

The oats are potatoe-oats, of superior quality, in both cases; but the weight of the imperial bushel from the subsoiled land is 3 stones, while the weight of the imperial bushel from the trenched land is 3 stones and 1 lb.: thus, the weight from the trenched land is greater per bushel, but by no means equal to countervail the deficiency of quantity.

When it is remembered that the outlay on this land was 6*l.* 18*s.* 4*d.* per acre, and that, 2 years ago, before it was drained, the rental was only 4*s.* 6*d.* per acre, it is clear that the value of this single crop not only repays the whole cost of the improvement, but is more than the fee-simple value of the land before it was improved.

In addition to this experiment I have had another year's experience of the effects of the subsoil-plough. I am confirmed in my opinion of its excellence; and the ploughmen, who at first were prejudiced against it, and condemned it as unwieldy, because it is a heavy and troublesome implement, now readily admit its usefulness, and concur with me in preferring it to trenching.

I am quite satisfied that the use of the subsoil-plough is no less applicable to dry land than to wet: on wet land it increases and ensures the operation of the drains; but, on all land, by loosening the sub-stratum, it adds to the effective depth of the soil,

whereby the nourishment to the plant is augmented; the root takes a deeper hold; and a more genial temperature is equally maintained below the surface throughout the year. If I mistake not, it will be found that sandy loams, no less than stiff clays, profit by this system of subsoil-ploughing; and that on dry land, no less than on wet, where sterility is the consequence of a hard, hide-bound, hungry subsoil, Mr. Smith's treatment is correct, which breaks the crust without bringing it to the surface, until in time it has been mellowed by the natural effects of atmosphere and rain.

In my former letter I mentioned a field of 20 acres of dry land, half of which I had ordered to be trench-ploughed to the depth of 14 inches, the other half to be stirred with Mr. Smith's plough. This has been done; the whole field was equally manured with bone-dust, and sown with white globe-turnips. The crop, though a late one, is tolerably promising; but not yet having pulled any portion of the turnips, which still are growing, I must postpone the detailed statement of the comparative weight of the crop with reference to the different treatment of the subsoil. I may say, however, that the turnips are best on the worst part of the field, where Mr. Smith's plough was used.

I wish to avail myself of this opportunity of stating a fact regarding seed potatoes, which came under my observation on my own farm this year. I planted the potatoes in a field which had been tile-drained, but not subsoiled; and, the drains acting imperfectly in this very wet season, the land was by no means dry, and the crop of potatoes failed in one portion of the field, but not in another. I made strict inquiries to obtain an explanation of this failure, which appeared capricious; and I found that, where the stitches had failed, the seed-potatoes had been sliced, or cut into sets for planting: where the crop was good, the seed-potatoes had been planted whole. It so happened that these whole potatoes were small, and considered almost refuse, therefore not cut into sets, but planted entire: they produced an excellent crop, above an average, even on wet land in a wet season; while, in the same field, and on land of the same quality, superior seed-potatoes, cut into sets, yielded a very inferior amount of produce. My own observation is confirmed by the experience of one of my tenants, who last spring planted, in equidistant stitches in the same field, potatoes cut into three sets, at intervals of 3 inches, and whole potatoes at intervals of 20 inches. The bulk of potatoes raised from the seed which had not been cut greatly exceeded the bulk raised from the seed which had been cut; and the tenant assures me that whole potatoes may safely be planted at 2 feet apart, the interval of 20 inches not having been sufficient; whereby the difference of the quantity used for seed will

be insignificant compared with the greater quantity of produce and the greater certainty of a crop.

It is not safe to draw a general inference from insulated facts; but I intend to repeat this experiment: and the great advantage of the Journal is the opportunity which it affords for fixing the attention of practical farmers on doubtful points, which require elucidation, and which, when cleared, may lead to safe conclusions of recognised importance and of universal application.

I have the honour to be,
Sir,
Your faithful servant,
J. R. G. Graham.

Netherby, Cumberland,
18*th Nov.*, 1839.

Postscript.

Since I addressed this letter to you I had a quarter of an acre of the turnips pulled, both on the land which was subsoiled and on the land which was trench-ploughed. The turnips have been carefully weighed, and the result is as follows:—

Weight of Turnips.

	Per Quarter-Acre.				Per Acre.		
	Tons.	cwt.	qr.		Tons.	cwt.	qr.
Quarter of an Acre of White Globe Turnips on land Subsoiled . .	4	19	1	.	19	17	0
Quarter of an Acre of ditto on land Trench-ploughed	4	13	0	.	18	12	0
Difference in favour of Subsoiling over Trenching .	0	6	1	.	1	5	0

The land subsoiled is certainly inferior to the land trench-ploughed; and I consider this experiment decisive against the prudence of bringing to the surface subsoil, even of the richest quality, before it has been mellowed by the process which Mr. Smith, of Deanston, recommends.

Netherby, 11*th Jan.*, 1840.

XXIII.—*Second Report of several Operations in Thorough-Draining and Subsoil-Ploughing, at Oakley Park.*—From Mr. Richard White.—Communicated by the Hon. Robert Henry Clive, M.P.

To the Hon. Robert Henry Clive, M.P.

Sir,

In my report to you, in February last, upon what had been effected by thorough-draining and subsoil-ploughing upon the farm in your own occupation, and in that report I stated that I had no doubt I should be able to lay before you the future proceedings with a favourable result. I will now endeavour to give you the full particulars in as explicit a manner as I can; but, previous to going into that detail, I beg to explain why I did not give you an account of the expence attending the subsoil-ploughing; viz., that I had not then clearly ascertained what that might be, owing to the method of working it. I first commenced with swingle-trees and eight horses, from which I found great difficulty, from the leading horses causing great pressure on the backs of the foot horses. After this trial, the tumbril-wheels were resorted to, which did better, but not satisfactory, as this method caused one set of horses to walk upon the land done: it then struck me that double shafts, with low wheels, would obviate all those difficulties. I have now adopted this method, and I am more fully enabled to give you a statement of the expence, which I will attach to the abstract of last year; from which I think it will enable you to judge the part or portion a landlord and tenant ought each to bear; and, as the opinions have varied so much as to the easiest and most effectual method of working it, I am induced to send you herewith a drawing, showing the manner in which the plough is worked, with a reference. Six horses are invariably used; and I now estimate the expence of the six horses at 3*s.* 6*d.* per day, each; and that 1 acre per day is done: so that, 1 guinea per acre is added to the expence of draining, getting stone, &c. The land subsoiled is not trod upon by any of the horses; and only one of the horses of the pair in the plough that precedes the subsoil-plough walks in the furrow, and one wheel goes on the land done, which I consider does no injury whatever: and this method appears to be generally approved of by those persons who have seen it work; and although I gave a description in my last report,* I think the drawing will show it more distinctly.

I now beg to go on with the result from last February; and, to make it quite clear, I shall introduce the abstract of that particular, and go through it by taking the separate fields, and report to you the success, also the addition of what has been drained

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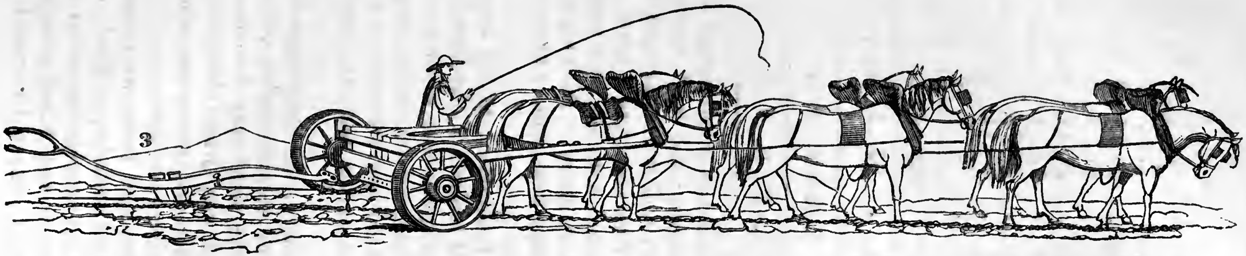
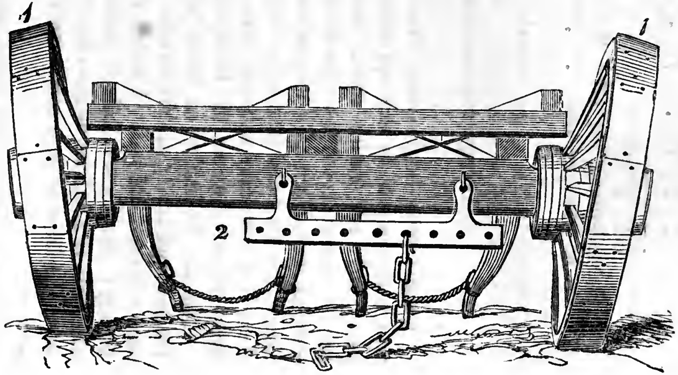
* Journal, Part I., page 35.

THE SUBSOIL-PLOUGH AT WORK.



THE DOUBLE-SHAFTS WITH LOW WHEELS.



1. The wheels, which are 3ft. 4in. high, and 6in. wide.
2. Iron bar, perforated with holes, for an alteration in the width of furrow, 2ft. 6in. long, 3in wide, and $\frac{3}{4}$ thick, is hung upon two hooks, screwed to axle-tree.
3. The plough, as at work, 15in. deep.

preparatory to subsoil-ploughing, together with the whole expence of the latter in addition.

ABSTRACT.

Quantities. A.	R.	P.	No.	Yards.	Amount. £.	s.	d.
10	1	29	1	8436	69	6	9
11	2	5	2	7314	47	3	0
7	0	14	3	3866	27	17	9
14	1	30	4	7133	55	1	0
5	0	0	5	3166	22	14	11
10	3	37	6	7459	66	11	4
7	1	0	7	6376	45	9	8
66	2	35		43750	334	4	5
Subsoil-ploughing 66 a. 2 r. 35 p., at 21*s.* per acre					70	1	1
Total					£404	5	6
Average expence per acre					£ 6	1	3

I shall now begin with No. 1, which was in turnips in 1838, and barley sown in the spring of this year: the land was twice ploughed; the barley sown broadcast; and the surface perfectly level; clover sown in the barley. The crop was a good deal lodged, and I am at a loss to estimate the quantity, but suppose about 26 bushels per acre, imperial measure. Although this field is a stiff clay subsoil, it is perfectly firm, and is most satistory, there being not the least defect.

No. 2. In barley in 1838, which I estimated at 30 imperial bushels per acre; and it turned out 29 bushels of the best grain, and 2 bushels of tail. Clover and rye-grass was sown with the barley; the clover failed, but the rye-grass was a fair crop; I attribute the failure of the clover to its too soon succeeding a poor ley: the land is now sown with wheat, and is perfectly level and sound.

No. 3. Barley this year, after turnips; the crop a good deal lodged, and in consequence it is difficult to estimate the quantity; it is similar to No. 1, and I consider the yield may be about 28 imperial bushels per acre. The land was twice ploughed, and the barley sown broadcast, with clover and rye-grass, which is very promising: the land is perfectly level and firm.

No. 4. This field was worked for, and sown with, turnips. Lime was applied liberally (about 180 bushels per acre), and a tolerable manuring in the drills. The turnips came up well; and, after the first hoeing, the wire-worm and black grub made sad havoc amongst them; so much so that, out of 14 acres, I think

there are not more than 5 acres, if put all together; those are good. The land is perfectly sound.

No. 5 is part of a field. Wheat (after fallow) this year: this part of the field is a stiff clay subsoil; previous to the draining and subsoiling the produce was very little. This year the wheat was an even good crop, upon a flat surface, and may be estimated at about 20 imperial bushels per acre: the difference in crop, compared with the other part of the field, was perfectly visible, and was noticed by several. The field was all limed alike, but no manure: it was previously in an impoverished, foul state. It is now intended for turnips next year. The land is now firm, and quite free from any defect or failure.

No. 6. Wheat this year, after fallow: well limed. The crop was much lodged and mildewed, and I am quite at a loss to estimate the quantity; it was much spoiled before cut, and the sample will be bad. This field was in an impoverished state. It is intended for turnips next year. The subsoil is a clay loam; and the draining is all quite perfect.

	A. R. P.		£.	s.	d.
No. 7..	7 1 0..	6376 yards: the soil is chiefly a clay loam; the drains 16 feet apart.—For cutting open, breaking and laying the stone, filling the drains, &c., at 1*d*. per yard	26	11	4
		Rising 340 loads of stone at the quarry, at 6*d*. per load	8	10	0
		Six horses carrying the above from the adjoining field, 10 days, at 18*s*. per day .	9	0	0
		Filling stone into carts, at 1½*d*. per load .	1	8	4
		Total expence . . £	45	9	8
		Per acre . £	6	10	0

Two years' old ley; drained in April, and sown with oats: now ready for the subsoil-plough, when the weather will permit. This piece is all that is made ready for the subsoil-plough this season. I stated to you that 17 acres was preparing for the subsoil-plough, but only part of another field is drained, and will come in course the following year.

Two fields of old meadow-land, containing about 10 acres, has been drained, and part manured, from which the increased produce and quality is great. A considerable preparation of compost, prepared, (upwards of 400 yards,) will be ready to apply to

the permanent grass the ensuing spring; and about 15 acres is irrigated, with a very good effect.

Although the summer and autumn has been unusually wet, I am glad to say that there is not the least defect in any part of the drained and subsoiled land; and I am well assured, if the field No. 2 had not been drained and subsoiled, it could not have been sown with wheat the present season: it is now perfectly flat and sound. I also beg to remark that, in carrying the barley of Nos. 1 to 3, the waggons and horses made very little impression upon the surface.

As it is my intention to lay before you annually the progressive improvement not only of the subsoil-plough and draining, but also a general outline of the management of the farm, with the result of such system or application of manure-compost, &c. &c., as may be applied—and as the farm was in an impoverished, foul state when you took it into your own hands—I cannot, at present, give you the course that may be best to adopt; but I hope to have it in my power to say something hereafter on that subject, together with the course of crops from the commencement.

I have the honour to be, Sir,

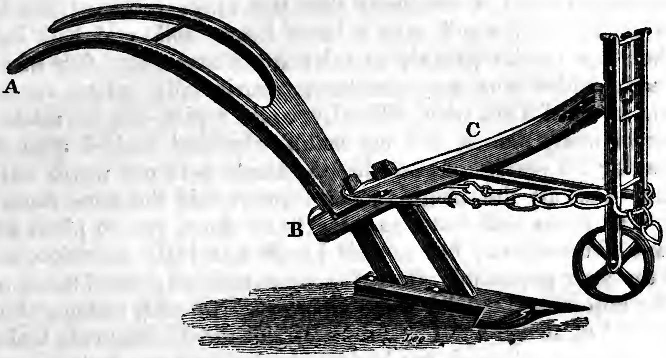
Your faithful and obedient humble servant,

RICHARD WHITE.

Prior's Halton, November, 1839.

XXIV.—*Account of the Operation of the Rackheath Subsoil-Plough, and also of the Sub-turf Plough, and the Pig's-head Potatoe Plough and Iron Hands.* By Sir Edward Stracey, Bart., F.R S.

The Rackheath Plough: invented by Sir Edward Stracey.



From A to B 6 feet.

N.B.—Particular care must be taken that the beam-ringle be of such sufficient length that the under part of the beam (C) does not rest upon the beam-ringle in any part; otherwise a fulcrum will be afforded between the wheel and the draught, which will cause the plough to rise at the heel.

To the Secretary of the English Agricultural Society.

Sir,

Having ever been unwilling to obtrude my sentiments or any invention of mine upon the public, I should never have addressed this letter to you had I not been informed by you, as Secretary to the English Agricultural Society, that in consequence of my subsoil-plough having excited some interest at the meeting of the Society at Oxford, it was the wish of the Committee of that society that I should give them some account of the operations of the plough. With that wish I comply, as were I to act otherwise I should feel wanting in respect to those individuals who have honoured me with their wish, and at the same time hoping that the agricultural interest may experience as much benefit from the use of the plough as I have for the last six years; and it will afford me the highest gratification if my humble endeavours can in any way improve the science of agriculture, as I cannot but feel that much, very much, is wanted. How many sciences are required? Mechanics, chemistry, geology, botany, entomology, &c. Perhaps no science requires a general acquaintance with more sciences than that of farming. But I must not suffer myself, by entering into a discussion on

so extensive a topic, to be led away from my present subject, "The Plough." Well, on my coming to reside on my estate at Rackheath, about six years since, I found 500 acres of heath-land, composing two farms, (which had been enclosed under an Act of Parliament about 40 years,) without tenants; the gorse, heather, and fern shooting up in all parts. In short, the land was in such a condition that the crops returned not the seed sown. The soil was a loose loamy soil, and had been broken up by the plough to a depth not exceeding *four inches,* beneath which was a sub-stratum (provincially called an iron pan), so hard that with difficulty could a pick-axe be made to enter in many places, and my bailiff, who had looked after the lands for 35 years, told me that the lands were not worth cultivation—that all the neighbouring farmers said the same thing—and that there was but one thing to be done, viz., to plant with fir and forest-trees; but to this I paid but little attention, as I had the year preceding allotted some parcels of ground taken out of the adjoining lands to some cottagers; to each cottage about one-third of an acre. The crops on all these allotments looked fine, healthy, and good, producing excellent wheat, carrots, peas, cabbages, potatoes, and other vegetables in abundance. The question then was, how was this done? On the outside of the cottage allotments all was barren. It could not be by the manure that had been laid on, for the cottages had none but that which they had scraped from the roads. The magic of all this I could ascribe to nothing else but the spade; they had broken up the land 18 inches deep. As to digging up 500 acres with the spade to the depth of 18 inches, at an expense of 6*l.* an acre, I would not attempt it. I accordingly considered that a plough might be constructed so as to loosen the soil to the depth of 18 inches, keeping the best soil to the depth of 4 inches, and near the surface, thus admitting air and moisture to the roots of the plants, and enabling them to extend their spongioles in search of food—for air, moisture, and extent of pasture are as necessary to the thriving and increase of vegetables as of animals. In this attempt I succeeded, as the result will show. I have now broken up all these 500 acres 18 inches deep; the process was by sending a common plough, drawn by two horses, to precede, which turned over the ground to the depth of 4 inches: my subsoil-plough immediately followed in the furrow made, drawn by four horses, stirring and breaking the soil 12 or 14 inches deeper, but not turning it over. Sometimes the iron pan was so hard that the horses were set fast, and it became necessary to use the pick-axe to release them before they could proceed. After the first year the land produced double the former crops, many of the carrots being 16 inches in length, and of a proportionate thickness. This

amendment could have arisen solely from the deep ploughing. Manure I had scarcely any, the land not producing then stover sufficient to keep any stock worth mentioning, and it was not possible to procure sufficient quantity from the town. The plough tore up by the roots all the old gorse, heather, and fern, so that the land lost all the distinctive character of heath land the first year after the deep ploughing, which it had retained, notwithstanding the ploughing with the common ploughs, for 35 years. Immediately after this subsoil-ploughing the crop of wheat was strong and long in the straw, and the grain close-bosomed and heavy, weighing full 64 lbs. to the bushel. The quantity, as might be expected, not large (about 26 bushels to the acre), but great in comparison to what it produced before. The millers were desirous of purchasing it, and could scarcely believe it was grown upon the heath land, as in former years my bailiff could with difficulty get a miller to look at his sample. Let this be borne in mind, that this land then had had no manure for years, was run out, and could only have been meliorated by the admission of air and moisture, by the deep ploughing. This year the wheat on this land has looked most promising; the ears large and heavy, the straw long; and I expect the produce will be from 34 to 36 bushels an acre: the wheat, the "golden drop." My Swedish turnips on this land this year are very good; my pudding and sugar-loaf turnips failing in many parts, sharing the fate of those of my neighbours, having been greatly injured by the torrents of rain which fell after they had shown themselves above the ground. Turnips must have a deep and well-pulverised soil, in order to enable them to swell, and the tap-roots to penetrate in search of food. The tap-root of a Swedish turnip has been known to penetrate 39 inches into the ground. I will not detain my readers much longer, and will only add two or three general observations.

1st. The work done by the plough far exceeds trenching with the spade, as the plough only breaks and loosens the land all around without turning the subsoil to the top, which in some cases (where the subsoil is bad) would be injurious to the early and tender plant; and if the subsoil is good, it would be rendered more fit for vegetation after the air and moisture had been permitted to enter. The ploughing is also far preferable to trenching by the spade even for planting, as it may be done at one-fourth the expence.

2ndly. It were very preferable, if possible, to work the horses abreast, pair and pair; but, in using this plough, the horses *must* work in a line, for if abreast, the horse on the land ploughed would soon be fatigued by sinking up to his hocks: and, to render the draught more easy, the second horse from the plough should

not be fastened to the chains of the horse next the plough; but the chains of that second horse should be made long enough to be hooked about 2 feet behind the back-band of the chains of the horse next the plough, so that the second horse will draw at an angle of about 33 degrees; otherwise, were the chains of the second horse hooked in front of the back chain, he would pull the whole weight of his draught, together with that of the horses preceding him, on the back of the horse next the plough; and the strength of that horse would be lost in the draught, as his whole powers would be exerted in his endeavours to prevent being brought down upon his knees. By so arranging the chains, the power of 3 horses would be equal to that of 4.

Now, being on the subject of the subsoil-plough, I may as well tell you I have contrived another plough, from the use of which the greatest benefit has been derived by my park land. I call this my "sub-turf plough." It is used to loosen the turf about 10½ inches deep below the surface, without turning over the flag; loosening the soil underneath—consequently, admitting the air and the rain—and permitting the roots of the herbage to spread in search of food. There are no marks left by which it can be known that the land has been so ploughed, except from the straight lines of the coulter, the lines at the distance of about 14 inches one from another. In about 3 months from the time of ploughing, these lines are totally obliterated, and the quantity of aftermarth, and the thickness of the bottom, have been the subject of admiration of all my neighbours. Another advantage from this sub-turf ploughing is, that before that took place water was lying stagnant in many parts (after heavy rains), especially in the lower grounds, to a great depth: now, no water is to be seen lying on any part, the whole being absorbed by the earth.*

In consequence of the great expence of digging up potatoes (viz., about 30*s.* an acre), I have made another plough, to turn them out of the ground, which I call the pigs'-head plough; the head of that animal suggesting the idea to me on observing how easily he turned the potatoes out of the ground. It has answered most satisfactorily. The plough works about 10 inches deep, and more if required, throwing up the potatoes on each side, partly covered with loose mould; to remove which, I have iron hands, made like the human hand, for the women to remove the mould with one hand, and with the other to collect the potatoes. A woman is placed on each side of the furrow, with a basket in the middle. A plough will employ 4 pair of women, placed at

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* In an experiment I have made with the Rackheath-plough, the absolute necessity of previously under-draining the land wherever the subsoil is retentive of moisture is clearly shown.—W. L. RHAM. *See page* 259.

different parts, to collect and to put the potatoes into the baskets (placing a basket between each pair), and two men to take away the baskets when filled, and empty them into a cart ready to receive them.

Any person is most welcome to have a model of any instrument of mine which they may deem worthy of their attention.

I am, Sir,
Yours, &c. &c.
EDWARD STRACEY.

Rackheath Hall, near Norwich,
September, 1839.

XXV.—*Experiments on the Improvement of Poor Lands by Subsoil-Ploughing, both with and without Underdraining.*—By The Rev. W. L. RHAM, M.A., Vicar of Winkfield.

To the Secretary of the English Agricultural Society.

SIR,

As it is of more importance to the progress of agriculture to have well-authenticated facts, and accurate details of different modes of cultivation, than mere theoretical speculations, I venture to lay before the English Agricultural Society the result of two Experiments, made with considerable attention to every circumstance which might influence the result.

I. The first which I shall mention may be found interesting at this moment in consequence of its throwing some light on the use of the subsoil-plough, which, although by no means a new invention, has lately been strongly recommended on particular soils, not without some discussions as to its merits, and doubts of its general usefulness.

The field which was the subject of the experiment was once a portion of the open common in the forest of Windsor, and brought into cultivation soon after the inclosure of the forest in 1813. Its soil consisted of a very moderate loam, inclined to yellow clay, only a few inches in depth; the subsoil chiefly a stiff clay, but with occasional portions of a very gravelly loam, nearly impervious to water. The surface is slightly undulated, and sufficiently inclined to let off the surface-water by means of open drains. It was first brought into cultivation by paring and burning the surface; and no very regular rotation of crops was followed. The first crop was turnips, broadcast; a very good crop, in consequence of the ashes. After this had been fed off by sheep, came oats; a good crop. It was then chalked, at the rate of about 15 tumbrel-loads to the acre, and manured with good dung, 6

tumbrels per acre. After this, part of the field was planted with potatoes, part with beans, and part with peas, as experiments; the crops were moderate. The next crops were half wheat and half oats; fair crops, about $3\frac{1}{2}$ quarters of wheat and between 5 and 6 quarters of oats per acre. A similar course was pursued, with variations, till within a few years, when rye-grass and clover were sown with the last crop. The grasses were mown twice for hay the next year. The two next years the field was pastured, chiefly with sheep.

This I consider to have completed the preparatory cultivation; and the field, when broken up, showed a manifest improvement in the depth, colour, and texture of the soil. After that it bore beans and wheat. It was then fallowed, in order to clear it of the coarse natural grasses which, in spite of all this cultivation, had not been entirely eradicated, and also of a considerable portion of couch-grass (*Triticum repens*), which had increased in the soil. Six acres of the field were subsoil-ploughed, early in 1838, to the depth of 14 or 15 inches, by means of the Rackheath-plough, made by Messrs. Ransome and Co., at Ipswich. A common swing-plough (the only plough I ever use), with two horses abreast, first made a furrow of about 6 inches deep. Not having a large team, I had several such furrows opened, and then the two horses, and two more, who had been carting manure while the other pair was ploughing, were yoked to the Rackheath-plough, which stirred the subsoil 9 or 10 inches deep. The common plough after that filled up the furrows. Thus somewhat less than half an acre a-day was subsoil-ploughed with 4 horses, the weather being very favourable. The land was now manured with 10 cart-loads of yard-dung to the acre: one acre was planted with potatoes; in another acre, mangold-wurzel seed was drilled in rows 18 inches apart; two acres were sown with Swedish turnips, and two acres with red tankard turnips. The mangold-wurzel was either taken off early by the fly, or failed; and turnip-seed was drilled over it. The Swedes were also sown a second time. Before Christmas there was a very good appearance of Swedes and turnips; which had been properly hoed two or three times, and were clean. I congratulated myself on the result of the experiment; and began to feed off the turnips with sheep, drawing a portion for the cows at home. The winter was wet, and I was soon obliged to remove the sheep. The ground became too hollow to bear the cart-wheels and the tread of the horses; and I began to regret having loosened the subsoil, which now held wet like a sponge. I had never thought that the field required underdraining. The water always ran off by the open drains before it was subsoil-ploughed; I might, therefore, very naturally have concluded that the subsoil-plough had now ruined my land. The turnips were

not eaten off or carted home till late in spring; and perhaps I should have lost the use of them altogether, or spoiled my land by cutting it up, if I had not determined on an effectual remedy.

I immediately ordered 18,000 draining-tiles, which fortunately I procured from different kilns in the neighbourhood: they were the footed tiles. The common size cost 2 guineas a thousand, besides carriage: they were 13 inches long; those for the main drains cost 3 guineas a thousand, 6 inches in diameter, but only 12 inches long. I laid out the drains 30 feet apart; the common drains 26 inches deep, the main drains 30 inches. An immense volume of water ran out of the drains before the tiles were put in; and, in a short time after they were filled up, my sheep returned to the fold, and my cart took the daily supply of turnips for the cows. The whole field was underdrained at a cost of 50*l.*, besides the carriage of the tiles, that is only 5*l.* per acre. Of the 6 acres which had been subsoil-ploughed, 2 were drilled with Chevalier barley and 4 with Tartarian oats. Red and white clover, rye-grass, and other grass-seeds, were sown after the land had been harrowed, and the surface was rolled. The season being moist, the clover grew very rapidly, and the barley suffered in consequence. The crop, notwithstanding, was fair, reckoned at about 4½ quarters to the acre; which is more than is usually grown in the neighbourhood. Had there been no clover, 6 quarters might have been fairly expected from the length of the straw and ears. The Tartarian oats kept down the clover. The straw rose above a man's head, and the crop was very heavy. It is not threshed out, but we estimate it at 9 quarters to the acre. From the yield of a small portion threshed, I have reason to think it will exceed this. The field is now (Dec. 21st), after all the rain which has fallen in autumn, as dry and sound as any pasture I have. My cows and horses have been occasionally turned into the field without making any impression; and the old water-furrows, which were dug out by my men, from habit, are quite dry, with fine clover in the bottom of them.

The conclusion to be drawn from this experiment is important, as it shows that, wherever the subsoil is retentive of moisture, complete underdraining is essential; and that the subsoil-plough should never be used until the water can run off below. It also shows what an improvement is made on moderate land by the union of draining and subsoil-ploughing. The cost is nothing when compared to the result. The 50*l.* I laid out on this field I consider as the most profitable investment I ever made. The 4 acres which were not subsoil-ploughed are in artificial grass: as soon as the field is again broken up, which will be in two or three years, this portion shall also have the benefit of the subsoil-plough.

II. The other experiment which I would mention was made on a field of 5 acres, of a cold wet clay. When I first took this field the soil was poor and heavy. About 5 or 6 inches of soil only had ever been stirred. All the land around is in permanent grass, being supposed too heavy and wet for profitable cultivation with the plough. The tenants are tied down, under heavy penalties, not to break it up. The mode in which my field had been cultivated before, was the old one of two corn crops, after a complete fallow. To attempt to have turnips there would have been considered as absolute folly. The first thing I did was to trench-plough it very partially, only bringing up about an inch of the yellow clay: and this was too much. It was then well chalked all over; a practice extensively followed here, where there is no calcareous earth in the natural soil. The chalk is carted seven miles, and is reckoned to cost 1*l.* per waggon-load when laid on the land. From 5 to 10 waggon-loads per acre are usually put on the land every 8 or 10 years, at the time it is fallowed.

I followed the old course of tillage, with the variation of wheat, beans, oats, and tares; manuring well, and fallowing every 4 or 5 years. But every course was attended with loss, as my accounts proved, although I had fair crops, paid a very low rent (for it is not my own), and it was tithe-free. This did not suit my purpose; but, as I had a lease of it, and could not give it up, I laid it down to grass with a crop of oats, sowing clover and a mixture of good grass-seeds. The feed of it would more than cover the rent and outgoings; and I could lay out my money to better advantage on improving my own land.

It remained in grass five years, in which time it was mown twice for hay, and fed three years. After the first two years the grass began to deteriorate, and at last the coarse grasses, especially *Alopecurus arvensis*, and the different varieties of *Agrostis* prevailed, and left bare spaces between them. I therefore determined to break it up. Preparatory to this I had all the old furrows ploughed out between the ridges which still remained. The sward which the plough raised was taken up and carted into heaps at the corners of the field, which was then ploughed and left for 6 weeks. On the 1st of January, 1835, the weather being very mild, beans were dibbled on it, in rows 15 inches distant, the beans being put in 4 inches asunder. They came up well, and were very carefully hoed three times, and the weeds pulled up by hand. The crop was abundant, the bean-stalks were high and well furnished with pods through their whole length. The produce was 30 quarters of excellent horse-beans (6 quarters per acre). The bean-stubble was cleared and the land cleaned with the scarifier, harrows, and rake, and then ploughed.

Red wheat was drilled upon it immediately, and produced next autumn 25 quarters of plump corn. I need not add that the wheat was hoed and weeded about the time it began to tiller. The wheat-stubble was ploughed soon after harvest, after a moderate coat of compost had been applied, and the field was sown with winter tares. This compost was made by mixing farm-yard dung with the earth which had been ploughed out of the furrows on breaking up the grass, and which had been turned over twice with the spade, so that it had the appearance of fine garden-mould. Great attention was paid to have water-furrows sufficient to carry off all superfluous water. The tares produced a good crop in 1837, which was partly made into hay; a small portion was cut up green for the horses; and a part, left for seed, was reaped in the end of August. Where the tares had been left for seed some manure was applied. The field, being again ploughed, was sown with wheat, and produced 20 quarters (4 quarters per acre). It was now apparent that the weeds were increasing, and that a cleaning became necessary: the wheat-stubble was therefore scarified, and the surface raked; the weeds were burnt, or carried off. The whole was ploughed as deep as possible before Christmas, and left rough to the influence of the frost. This was in 1838. As soon as the business of the farm permitted in the spring of 1839 the field was ploughed level by reversing the furrows; the heavy harrow, called here the drag, was drawn over in all directions, and all the roots and weeds were collected. It was next ploughed at right angles to the first direction, and after a little time harrowed repeatedly, and all root-weeds carefully forked out. In April, after spreading about 18 cubic yards of fresh stable-dung on 1½ acre, potatoes were put, 12 inches apart, into every third furrow, after the plough, the manure being raked over the sets, and covered by the returning plough. On the remainder of the field, the rest of the manure, consisting of about 40 cart-loads of good yard-dung, which had been carted on to the headland from the yard, and there turned over once, was spread evenly. It was now ploughed into very small ridges, 32 inches wide, each consisting of 2 furrows up and 2 down, or 2 *bouts*, as they are called. On the top of these ridges, after a light harrow had gone over, one row of Swedish turnips, or of the red globe-turnips, was drilled. Plenty of seed was used to secure a plant. After this, the turnips, which came up well, were cultivated after the Northumberland manner; the intervals were ploughed, first laying the earth from the turnips, and then to them again. The double mould-board plough, which reached down to the yellow clay, deepened the middle furrows, and gave a free course to the water.

The Swedes and red rounds are as good a crop as I could desire.

The distance of the ridges will allow the wheels of my carts to take 2 ridges between them, the horse walking in the interval between them. Thus I shall draw the turnips without injury to the land, even in wet weather; but I mean to avail myself of a few dry days to take them off and set them in a sheltered situation, as close as possible, with the tops on, where they will continue to vegetate slowly, and no frost will injure them, as I know by experience.—

This minute detail of my operations may appear tedious, but it tends to establish an important fact, that cold wet clays may be improved so as to bear good crops of turnips, even without underdraining. I do not pretend to say that underdraining would not greatly improve this field; but it has not suited my purpose or convenience to do so hitherto, and I have made it profitable without draining. I would not on any account use the subsoil-plough here, unless I first drained it thoroughly.

The subsoil-plough does wonders in lands which have a porous subsoil, even when employed *by itself;* but, unless its application on stiff wet lands be accompanied *with draining,* it makes them worse, keeping in the water which would otherwise run off the surface.

W. L. Rham.

Winkfield, Berkshire, November 1, 1839.

XXVI.—*On French Agriculture and State Establishments.* By John Evelyn Denison, Esq.

A spirit of agricultural improvement is showing itself in France. At a moment when this subject is attracting so large a share of public attention in this country, it may be a matter of interest to some persons to know what is the present condition of agriculture among our neighbours in France, and what are the means in operation towards its advancement.

That the two countries differ most widely in all that relates to agriculture—that, seeking the same end of improved cultivation, they set out almost from opposite points and employ very different means,—would increase rather than diminish the interest of this inquiry.

In England the land is in great measure owned by large proprietors, and cultivated by tenants possessed of capital and skill:—

In France the land is almost infinitely subdivided among small proprietors.

In England the individual enterprise of landlords and tenants detects deficiencies, and supplies the remedy:—

In France, from the want of capitalists, the government is

obliged to take the part of instigator and chief agent in the career of improvement.

In comparison with the English system of enclosures, France may be called one vast open field. You may travel from Calais to Paris, from Paris to the German frontier, to the Alps, to the Pyrenees, and scarcely see a hedge or a partition-fence of any sort. This vast open field (unlike the open districts of England, where the operations of farming are generally conducted on the largest scale) is cut up into the smallest conceivable plots of every variety of produce. As far as the eye can reach, over vast plains bounded by sloping hills, you see the surface varied by every description of crop; none perhaps above an acre or two in size, the larger portion not more than the fourth or the eighth of an acre. Here a vineyard 100 yards by 20, there a strip of wheat, lucerne, barley, oats, potatoes, clover, vetches. Few roads intersect this extensive garden, which from the nature of the cultivation must be traversed every day in all directions by the proprietors and cultivators of the various lots. The owner of a plot of lucerne, half a mile from the high road, must pass one neighbour's vineyard, another's wheat, and fifty such varieties, to reach his own plot, where he must cut his lucerne, make it into hay, and carry it home, either on his own back, or piled on an ass or horse, along the narrow paths which intersect the plots. The residences of these proprietors are almost invariably congregated into villages or towns, and lie therefore, for the most part, quite wide of their respective allotments.

Upon English principles of farming and of rural economy it is difficult to imagine how such a system of cultivation can be carried on successfully and profitably for a series of years. How is manure to be made? how are cattle, the great agents in reproduction, to be kept, and restoration to be made to the land? It is clear that over this vast open field, thus laid out, no cattle can depasture, and, though a certain amount of stock may be kept in stables, the amount must be limited from the want of winter food, as few or no turnips are seen, and the transport of manure to the distant plots from the want of roads and tracks must be operose and expensive.

Such is the condition of a large portion of the surface of France. There are extensive tracts of forest, of pasture, of vineyard, and in some parts of corn lands, which have not been subjected to this process of division, but the desire to possess an interest in the land, however small, is a ruling passion among the population of France, and the principle of division is proceeding in its unchecked career. What results will follow from this hitherto unproved experiment occupies, as may be well supposed, no small share of public attention in France. The comparative advantages of large and small properties have been discussed under all their aspects,

and speculated upon as to all their consequences, agricultural, social, and political. There is no doubt that in several articles of produce, and especially in that of wine, the increase has been considerable under the new order of things. But again, no culture makes so small a return in manure as wine, and it does not appear that, with increased quantity, there has been an improvement in quality, and in no product is quality so important as in that of wine.* Mons. Chaptal, in his able work on the "Application of Chemistry to Agriculture," enters at length on the subject of large and small properties; and in deciding in favour of the subdivision of lands, after enumerating many of its favourable features, thus escapes from the difficulties of the question:—

"After all," he says, "we do not see the principle of subdivision prevail in those districts peculiarly suited to the larger culture, the vast domains of La Bauce, of La Brie, of Soissormais, of Haut Languedoc, remain without division, and are still the granaries of France. The rich pastures of Normandy, of Poitou, of Anjou, feed the same number of cattle, our large forests continue in their integrity, the population and the means of subsistence are both considerably increased, our markets are abundantly supplied. Ease is on every side extended over our fields, industry makes rapid progress, the public imposts are readily and regularly paid. Let us take care how we disturb, by laws affecting property, this general harmony, and this public well-being, which assure the happiness and prosperity of our country." †

This inquiry in all its branches is full of interest, but to pursue it would lead us into too wide a field, and into the discussion of topics in some respects beside the purposes of this publication. We must confine ourselves on the present occasion to the agricultural considerations alone.

In this state of divided means throughout the country the government steps in, and, partly by establishments maintained entirely at its own cost, partly by aiding local institutions with its patronage and funds, leads the way in the path of improvement.

The establishments maintained entirely by the government are—

1. Sheep Farms	3. Veterinary Schools
2. Model Farms	4. Haras or Studs.

The institutions aided by government funds and patronage are—

1. Public Lectures	3. Local Associations
2. Agricultural Societies	4. Departmental Model Farms.

* The quality can rarely be improved by manure. Not many years since a celebrated growth of Burgundy was greatly injured by a profuse application of dung to the land. The vintage was abundant, but the wine fell so materially in price, as to occasion a heavy loss to the proprietors, until the soil recovered its natural state.—F. Burke.

† May not all this be attributed in some degree to the prevalent system of spade-culture?—F. Burke.

Sheep Farms.—The sheep farms are three in number, at Rambouillet, Perpignan, La Hayevaux. They are devoted to rearing the best breeds of sheep, and of trying experiments in crosses. The breeds chiefly attended to are the Merino, the Naz, a race with fine wool, but of very small frames, and the English long-wool sheep.

There is an annual sale of the produce, of the wool, and of rams, &c. At these sales the results are exposed to the public, who may judge for themselves, and turn them to the best account in their power, under open competition. These sales nearly cover the expences of management, and it is expected that soon they will quite do so. At Rambouillet the sale this year of 41 picked rams, and 49 ewes of the Merino breed, produced 1117*l.*, above 12*l.* a-piece. Some rams fetched 60*l.* Of the Naz Rambouillet breed 10 rams sold for 14*l.* each. The object sought in the Naz Rambouillet cross is to ascertain to what point increased weight of carcase and of fleece can be carried, without sacrificing the fineness of the wool.

The English flock consists of 320 head, and it is proposed to fix them somewhere near Calais or in Normandy, that they may have the advantage of a climate as nearly resembling their own as possible. Of this flock 29 rams fetched 5*l.* 16*s.* each, 20 ewes 4*l.* each. Rambouillet has 715 head of sheep, Perpignan 504, La Hayevaux 312.

Model Farms.—Of the model farms maintained entirely at the government charge, Grignon is the chief. It was founded in 1829, and consists of 1100 acres of land of different qualities, arable, pasture, meadow, water meadow, wood. Here the best implements, collected from England and Germany, are put to trial, the best systems followed under the guidance of an able professor, and theory and practice go hand in hand.

The pupils are divided under the heads of "internal" and "external;" the first board and lodge within the walls of the establishment, the second find lodgings for themselves and attend only the courses of instruction. The charges for the first vary from 60*l.* to 30*l.* a-year; for the second, from 20*l.* to 8*l.* The shortest course occupies two years, after which time, on passing a public examination, a pupil may receive his diploma, taking rank as a sort of Master of Arts of Grignon.

Veterinary Schools.—There are three chief veterinary schools, at Alfort, near Paris, Toulouse, Lyons. The course of education lasts four years. Botany and chemistry, as well as anatomy, are taught, and strict examinations take place before the students can receive their diplomas. Besides the horses used for examination and dissection in the schools, invalid horses are taken in at a moderate rate, and treated in the hospital, so that a large field of

practice is opened to the students. At Alfort there are 280 scholars. These youths are lodged, boarded, washed, and instructed for 14*l.* a-year. Out of the number the government provides appointments for about 40 in the cavalry and in other departments. There is a considerable space of ground attached to the establishment, and a botanical garden. As it is intended that the youths educated here should be instructed in all points of useful practice relating to agriculture, that in after-life they may be of more general use in the farming districts, an establishment of sheep, pigs, and dogs is kept up, in order to illustrate the diseases and treatment of these animals. In order to let the country people know who have obtained diplomas in the veterinary schools, the prefets have orders to fix up a list of their names in each commune.

Here, too, a part of the herd of short-horn Durham cattle, bought of late years by the government, has been brought, for the edification of the Parisians, as specimens of the improved breed. They have 2 bulls and 8 or 10 cows of this breed at Alfort, kept always in the stable, looking well, and well attended to.

It is proposed to establish a breeding-herd of short-horns at Du Pin in Normandy, in connection with the great breeding-stud for horses now flourishing there. The favourite colour in France is red, and that colour is preferred perfect, not broken into roan, as with us.

At present, though the Government circular of 1838 especially invited public attention to this improved breed of cattle, a taste for it does not appear to have made great progress in France.

Haras, or Studs.—The haras or studs are by far the largest and most expensive of the government establishments connected with rural affairs: of these haras, three are breeding establishments, where mares and foals are kept—Du Pin, Rozieres, Pompadour. The principal haras is that of Du Pin in Normandy, where some of the best horses are bred from pure English blood. At Rozieres the chief attention is directed to a mixed breed, that has been long established in that neighbourhood, called the "race ducale," from the Dukes de Deux Ponts, the former possessors. At Pompadour the breed is almost exclusively Arab and Persian; they have 40 Arab mares, and a great many Arab horses.

These establishments altogether contain no less than 1300 horses. Of thorough-bred stock they have 167 stallions, 98 mares, 121 colts and fillies.

The covering stallions for the departments amount to 870, who cover on an average 35 mares each, making 30,450 mares covered yearly by government stallions, These stallions do not travel, but are kept at their respective stations.

In the last Report presented to the Chamber, the result of the home breed is pronounced to be quite satisfactory. They have come out at the public races, and have proved their good qualities by public running. The Report predicts that they shall soon be independent of English supply, except for an occasional cross of the best and most esteemed blood.

A French stud-book has been published, with a complete list of all the thorough-bred horses imported, or bred in France. The Government intends to collect the necessary documents to continue its publication.

The breed of carriage-horses is improving in Normandy, where trotting matches have been instituted.

Besides these large establishments, individual enterprise is encouraged by the offer of prizes to any one who proposes to travel a stallion which shall be approved of by the authorities. The prizes are, for a riding-horse, from 12*l.* to 24*l.*; a carriage-horse, 8*l.* to 20*l.*; a cart-horse, 4*l.* to 8*l.*: for thorough-bred brood mares, Arab, Barb, Turkish, Persian, or English, from 8*l.* to 16*l.*: for a country mare, covered by a thorough-bred horse, from 8*l.* to 12*l.*

These high premiums, it appears, have led to some abuses. The possessors of the prize mares, instead of preserving them for breeding, in fulfilment of the intention of the Government, finding an increased facility in their sale from the prizes they have gained, have sold them out of the districts. To prevent this, the premium is now spread over a term of three years, half is paid in the two first years, and half in the third year.

The difficulty of conducting these large establishments from one centre point of management must be great, requiring machinery of proportionate power and compass. The correspondence is voluminous, and the returns infinite. Nothing would better illustrate this than a glance at the rules and orders of the haras. The royal ordonnance for the "organization and regulation of the haras" fills a quarto volume of 52 pages. The duties of inspectors-general, of directors, of local inspectors, of special agents, of surveyors, of veterinary surgeons, of breakers, of jockeys, of working grooms, are set forth with full particulars; the dress of each is prescribed through every article of his wardrobe, from the military hat with a black plume of the inspector-general, the blue stable jacket, cut à l'Anglaise, of the groom, his pantaloons garnis de demi-bottes simulées en cuir, down to his leather straps, and his two black hair stocks.

Everything relating to the horses is fixed with equal precision. Their stations at head-quarters, their posts during the season, their allowance of forage, when stationary, and when moving,

varying not only with the months of the year, but in the different districts of the country.

To take, for instance, the 3 first on the list of the 23 stations enumerated: *—

	Ordinary Allowance.					Allowance during the Season.				
	Oats.	Hay.		Straw.		Oats.	Hay.		Straw.	
	Pints.	lbs.	oz.	lbs.	oz.	Pints.	lbs.	oz.	lbs.	oz.
Abbeville . .	16	6	11	17	10	21	6	11	17	10
Angers . . .	14	11	0	13	4	17½	11	0	13	4
Aurillac . . .	14	11	0	15	7	16	11	0	15	7

Each article of horse furniture is prescribed. To every horse a rug, surcingle, and pad, and all necessary tackle for exercise, a complete English saddle, two bridles, a stable bag, with the necessary utensils for grooming, brush, currycomb, sponge, rubber, pair of scissors, picker, scraper, comb. The heads of the establishment are to examine every eight days whether all these articles are in their places, and to report to their superiors in written formulas.

It is unnecessary to say that the system of accounts provides every conceivable check and safeguard.

But these minute regulations are not confined to the departments alone, but extend to individuals with whom they come in contact. Rule 48 provides that every individual who shall have brought a mare to the royal stud must acquaint the chief of the station, where the mare shall have been covered, with the sex of the produce. He must, moreover, sign a declaration on the card which shall be delivered to him at the station, setting forth the birth, with a description of the colour of the foal. This declaration, signed by him, must be attested by the mayor of the commune, who shall transmit it, through the medium of the préfet, or sous-préfet, to the director of the haras, who, after the verifica-

* The following are the original French measures and weights, from which the above English values have been obtained:—

	Ordinary Allowance.			Allowance during the Season.		
	Oats.	Hay.	Straw.	Oats.	Hay.	Straw.
	Lit.	Kilo.	Kilo.	Lit.	Kilo.	Kilo.
Abbeville . .	9	3	8	12	3	8
Angers . . .	8	5	6	10	5	6
Aurillac . . .	8	5	7	9	5	7

tion of the card of the covering, shall address in exchange, and through the same channel, to the proprietor of the mare, a certificate bearing evidence of the facts there enumerated.

This looks like very cumbersome machinery among a rural people, for an object of small importance, and the whole operation seems to revolve in a circle, bringing back in the end a certificate to the individual proprietor, of a fact of which he, in the first instance, supplied a certificate himself.

But these infinite circles of correspondence result necessarily from the nature of establishments governed from a common centre.

The second branch of assistance afforded by government consists in disseminating information and instruction in matters relating to agriculture, and in trying, practically, experiments; by public lectures, by societies, by associations, and by departmental model farms. There are three principal courses of lectures on agriculture: and, by a regulation made in 1836, the science of agriculture, divided into three branches—cultivation, mechanics, and chemistry,—forms part of the superior instruction in the Conservatoire des Arts et Métiers.

With respect to the societies and associations, and departmental model farms, the course pursued by the government is to require annual reports through the préfets, who forward applications from those quarters where assistance is desired. The government asks, "Have you land for a model farm; have you a subscription, and to what amount?" When these preliminaries are satisfactorily arranged, the government grants the assistance required.

The societies, the chief of which is at Paris, are chiefly engaged in theoretical matters, in proposing prize essays, corresponding with other societies, &c. The associations (or comices) are exactly like our local agricultural societies; holding meetings, granting prizes for good conduct, for good management, for improved implements, improved breeds of cattle, &c. To show the rapid progress which these institutions are making, there were—

	Societies.	Associations.
In the year 1824 . .	17	41
" " 1839 . .	154	468

The government grant is generally about 40*l.* to each society, and from 8*l.* to 20*l.* to each association.

In addition to all this, with a view to attempt to naturalise the tea-plant in France, an agent has been sent to the Brazils, to collect information and to send home plants. An agent has also been sent to China, to learn the management of silk-worms, and to collect information also about the tea-plant. A distinguished

member of the Academy of Sciences has been sent into the departments, to examine into the mischiefs done by insects, and to suggest remedies.

The expence of all these undertakings is very considerable. The gross outlay,* after deducting all receipts from various sources, appears to be as follows, calculated in English money:—

	£.
Sheep Farms	2,303
Veterinary Schools . . .	11,263
Haras, or Studs . . .	70,526
Vote of the Chamber, covering the other Items of Expence. .	32,000
Department of Government .	3,360
	£119,452

The notice, under all these different heads, has been confined within the narrowest possible compass. More detailed information on any one of them might be supplied on a future occasion.

In most of the important branches of agriculture, the rotation of crops, the breeds of cattle, and implements of husbandry, this country is no doubt far in advance of her continental neighbour; but in the discovery of chemical appliances, in the creation and management of artificial manures, their ingenuity and skill may afford us the most valuable assistance.† It cannot fail, indeed, looking at the immense surface of France, the variety of its climate, soil, and productions, when the active and acute mind of its people is turned towards these subjects, that important and most beneficial results should follow. It will befit all those interested in these pursuits in England, and especially members of the English Agricultural Society, to institute and maintain a correspondence with their farming brethren of France, which, the more intimate it should become, would redound with greater advantages to both countries.‡

* The expence is annual, and now voted every year in the Chambers.—Jan. 26, 1840.—The Author.

† Dried night soil is very extensively used, and well prepared in France, where it is generally employed as a top-dressing. If supplied here, at a moderate expence, there can be little doubt that the objections made to it, in this country, would be soon surmounted; but the vendors charge so high for it, that farmers are deterred from its purchase.—F. Burke.

‡ The official documents from which this Paper has in part been compiled were furnished to the writer, together with much valuable information, by the kindness of Monsieur Boulay de la Meurthe, the Chief Secretary at the Office of Public Works, Agriculture, and Commerce, at Paris.—The Author.

XXVII.—*On the Application of Geology to Agriculture.*—By Sir John V. B. Johnstone, Bart., F.G.S.—Communicated by Philip Pusey, Esq., M.P.

My dear Pusey,

In compliance with your request that I would furnish you with the particulars of the geological map and survey of my Yorkshire estate, made several years ago by Dr. Smith (whose recent loss we have to deplore), with the view of enabling you to ascertain how far the facts and practical results thus obtained are likely to elucidate the necessary connexion between geology and agriculture, I have much pleasure in placing the following observations in your hands, begging you will make any use you please of them in illustrating an inquiry of so useful and interesting a nature.

In the year 1828, having observed great variations in the soils upon my estate, not only on the sides of the hills, which might be expected, but also in the fields upon the table-land forming the summits of these hills, and which, from being flat, or rather declining to the south with a gradual and easy slope, rendered the variation more difficult to explain, I mentioned the subject to Dr. Smith, who was then lecturing at Scarborough, and surveying the surrounding district, with the view of proving the identity of the Hackness strata with those near Oxford. He at once offered a solution of my difficulty by a reference to geology; and, having gone over minutely the fields in question, with a reduced map of my estate in his hands, he marked upon it, in different colours, the ranges of these strata, as they exhibited themselves in succession upon the surface, forming themselves into zones or breadths of one, two, or more fields together, according as the particular stratum which came to the surface was more or less horizontal, or more or less thick.

The result thus obtained clearly demonstrated that the value of each field, and the mode of cultivation already adopted (with the exception of the use of lime, which had been too frequently and too indiscriminately applied to the entire estate), corresponded to the variations of the strata, and were limited by the areas which these occupied on the surface; thus showing that (though the results had been arrived at by the farmers through a different process, viz., trial and error) the geological character of a country, when accurately understood, pointed out at once the natural value of the land, and the system of cultivation best adapted to it. For instance, on the highest range of my hills, a few fields, without any apparent reason, have been universally productive in all seasons, more so than the fields adjoining them on a lower level, and which appeared *nearly* of the same quality. The fossils, and other marks well understood by Dr. Smith, proved them to consist of

an insulated portion of the UPPER calcareous grit formation, which also produces an excellent tract of land in another part of Yorkshire.*

So also through all the successive divisions of the upper oolitic series, which compose this estate, it was seen that the best upland grass-land was on the peculiar zone or stratum formed on the coralline oolite through all the farms, though separated from each other by wide intervals.

We also discovered what, when followed out in other districts, may prove a most valuable fact, that the wheat is usually only thrown out in severe frosts upon those fields formed by this same coralline oolite; the same cause having no effect upon the *adjoining fields,* which are on a different stratum, lower in the series, and of a sandy nature, with no calcareous matter in them. A limestone road, as you know, lifts more in frost than a gravel road; and a different method of planting wheat upon chalk, or other calcareous soils, must be pursued than that usually adopted, if we wish to SECURE our wheat crops from failure from this particular cause.

Next we found (as is the case over an extensive district here) that the entire surface of the portion as yet left out of cultivation upon the estate was formed by the worst beds of the calcareous grit, which (notwithstanding their name) contain no calcareous matter whatever. On analysing three divisions of the calcareous grit rock at Scarborough, I find that the two upper beds are calcareous, the highest of the two in the greatest degree, probably from its vicinity to the coralline oolite, which immediately covers it; but a lower bed there, like that at Hackness, is entirely destitute of lime. This distinction should be followed out and tested in other districts, as we know that in many places the calcareous grit forms very good land; probably this arises from the calcareous beds being there uppermost. Again, when, on descending the hill-sides, it was found that there were certain fields which, whether towards the south or north, whatever the aspect,

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* I believe I have made one geological mistake in that part of my Letter which alludes to an insulated vein of land upon a high level of very superior quality, and which I have named, following Dr. Smith's opinion, *upper calcareous grit*—the highest formation in the oolitic series, and not very common. Subsequent closer investigation by other geologists, and a discovery of some fresh fossils, makes me now think that the vein in question is upon the upper good bed of the *ordinary* calcareous grit, below the coralline oolite, and which does not appear elsewhere in the neighbourhood. Whichever formation, however, of the two it may belong to, the *peculiarity* remains the same. Both strata in other districts form good land.

I have *now* no doubt whatever that the soils upon the calcareous grit formation always vary according as the particular beds of that stratum come uppermost.—*January* 17, 1840. THE AUTHOR.

whatever the local circumstances (so long as not too steep to be ploughed), invariably produced good wheat, it was a triumph for agricultural geology to discover that these fields were invariably upon the Oxford clay, or rather where the lower beds of the calc. grit become mixed up with that formation; and, comparing the comparative value and growth of timber produced upon different portions of the slopes where too steep for ploughing, it was satisfactorily established, that oaks flourished the best upon this identical stratum or zone wherever existing. It also appeared on examination that the lowest bed of this same Oxford clay was the only water-tight stratified bed on the estate, and threw out every spring on the hill sides—a fact which, had it been known some years ago, coupled with the knowledge we now possess of the thickness of the superincumbent strata, would have saved much money, expended in sinking for wells upon the highest range of these hills. The facility with which water had been obtained by shallow wells on a *neighbouring summit* had probably misled the then managers of the estate. Dr. Smith discovered that the height last named was covered with diluvium, which had a water-tight seam in it below the gravel, a few feet below the surface, and thus produced the well or spring. In this case, geological knowledge would have shown at once the different construction of the two hills. It is a curious fact that the greatest mass of diluvial matter upon the estate should be on one of the *highest summit* levels; thus giving water at an easy depth, and forming a tract of good grass land.

I may therefore fairly say, that the geological map and survey of my estate (which I allow is peculiarly adapted for such an experiment, through the variety and number of the subdivisions of the oolitic series which develop themselves successively upon the surface,) has not only explained the reason of the discrepancy between the soil and productiveness of neighbouring fields—a matter of great interest, and tending to develop the true conditions of vegetable life—but that the following positive practical results will also have been derived from it:—

1st. The knowledge of applying lime to *advantage* over the property.

2nd. Laying down fields to *advantage* to grass, and where and how to plant wheat.

3rd. What sorts of trees to plant upon each stratum. It is moreover important to possess a sort of theory of the whole series of soils, which explains many of their peculiarities, and furnishes hints for future agricultural operations.

I have before observed, that the best grass land upon the hills is upon the coralline oolite beds. The analysis of the soil generally resting on this formation is as follows, the result being ob-

tained by pursuing the methods recommended by Mr. Rham, in his article published in the first Number of our Journal (p. 46, &c.):—

Sand	77·0
Clay	11·0
Carb. Lime . . .	7·0
Humus	1·5
Loss	3·5
	100·0

Here I may observe, that this mode of analysis (according to my own imperfect trials, in which I was assisted by a chemist) gives a very good *mechanical* division of the particles of the soil, but not a chemical one, for it does not separate the clay from the vegetable matter, as may be proved by the application of the usual tests.* In testing the supposed portion of clay with sulphuric acid and potass, alumina was shown, and a sensible portion of humus also. The same tests being applied to the *humus*, several crystals of alum became visible, particularly when heated over the spirit-lamp.

There is probably more humus in the soil than is shown by Mr. Rham's analysis.

We burn chiefly the upper beds of this formation for lime, and I find that the rock contains 93 per cent. of carbonate of lime, and ½ per cent. of iron, the remainder being clay and silica, in nearly equal proportions. My geological map at once points out all those portions of the estate which consist of this stratum, and upon which there is obviously no necessity for lime; and I am thus saved from the task which otherwise I should have to encounter of analysing the soil of each individual field.

The above are a few of the more striking results which have followed from the geological survey of my estate, and may perhaps serve to show that, by pursuing a similar system over different districts of our island, the knowledge of the regular

* The observation is correct; the analysis which I gave in my prize essay was confessedly only a mechanical separation of the constituent parts of a soil. There is always a portion of humus left in the finest portion of the clay, and also of the chalk, which adheres to it by cohesion, if not by a chemical combination. In the same manner some fine particles of earth are washed over with the humus, however carefully the decantation may be effected. But this does not invalidate the result, which is merely comparative; and, with a little care, the proper correction is easily made. From the proportion of sand in the soil above analysed, if it was taken some inches below the surface, it is probable that the real quantity of humus does not exceed 2 per cent. Some portion was probably included in the 3·5 per cent. loss, and carried off with the water used in the operation. This seems not to have been evaporated to obtain the soluble portion.—W. L. Rham.

It was NOT evaporated.—The Author.

stratification of the earth may be made subservient to the systematic arrangement of those facts, trials, and experiments which societies like this will encourage and collect. It is quite clear that the results of the best local practice on different soils have never yet been generalised, nor even had the benefit of a judicious selection. Certain soils are so obviously connected with their bases, that we need scarcely ask how geology and agriculture are linked together; and to use Dr. Smith's own words, "The strata succeed each other in a certain order, and, being delineated, a knowledge of the strata becomes the natural and safe foundation of improvement; and if agricultural chemistry be ever successfully applied to the practical purposes of agriculture, it must be by proceeding with the chemical analysis of soils along the range of each stratum."

Proceeding then on the positive basis established by the science of geology, we may spread on that base a new layer of facts, with ready references to them for local use or general reasoning.

Arranged upon maps they may be readily seen, compared, and generalised. When any two parties have made experiments upon the same stratum, no matter which, a comparison can then be made. Chemists will thus be called into action, and as the different limestone soils and clays, &c. vary, so in lieu of the general terms sandy, loamy, or clayey, which are only generic distinctions of little use, specific distinctions derived from geological terms will hereafter be used.

JOHN V. B. JOHNSTONE.

Hackness, near Scarborough,
Nov. 14*th*, 1839.

XXVIII.—*On the Use of Saltpetre as Manure.* By GEORGE KIMBERLEY, Esq.

To take a retrospective view of the use of saltpetre (or nitrate of potash) as a manure, may well at the present day be considered superfluous, but it may not be amiss to remind the reader that saltpetre was known and used as long since as the time of Virgil, and we find a notice or hint of the effects of nitre or nitrous water worth the attention of farmers in the *Sylva* of Bacon, published in the year 1670. Evelyn also understood some of the advantages of saltpetre as a manure; it has also been tried and reported on by various authors down to the year 1828, when, in No. 3 of the 'Quarterly Journal of Agriculture' we find an account of its use by William Hawkins, Esq., of Hitchin, Hertfordshire, where the experiments appear very satisfactory and conclusive. Since that

time, though the use of saltpetre has been partially continued, yet it may be said, considering its value, that it has been much neglected; nor does it ever appear to have been established as a standard auxiliary manure. Mr. Cuthbert Johnson justly observes, "that the agricultural uses of saltpetre have not been examined so carefully or generally as they ought to have been." The neglect of so valuable a fertiliser when there are thousands of acres requiring such assistance, is most extraordinary, and attempts have been made by different authors to account for it. One supposes that the price may have been an obstacle; another that it was not obtained pure, and therefore the experiments failed. But my observations on the use of artificial manures generally lead me to other conclusions, and I think the history of saltpetre furnishes us with the history of nearly all artificial, but particularly saline manures, the use of which, I regret to observe, has been successively and hastily adopted, without reference in many cases to season, soil, climate, or quantity; and as a few fortunate experiments *have started into a fashion* the use of these articles, so one or two unseasonable or improper applications has at once condemned them to neglect and oblivion; and though from the advancement of science I should now hope for some more satisfactory result from the trial of that class of fertilisers, I fear that the indiscriminate use to which I daily see and hear of their being applied will again end in their expulsion from that rank in which they ought to stand, as great and useful auxiliaries to our stock of known manures. It is not my intention to make a compilation from the various authors who have written on saltpetre, but as all persons may not have seen the article above mentioned in the Quarterly Journal, I may I hope be excused for extracting so much of the report as will give some weight to my own opinions, and direct the attention of the public to so important a statement. It there appears that Lord Dacre and 10 other gentlemen and farmers have used saltpetre for different periods, varying from 15 to 3 years, on almost all sorts of crops, and though there are some differences of opinion as to its merits as a manure for wheat, yet the whole of the report may be considered as conclusive of the value of saltpetre as a top dressing; but I beg to refer gentlemen to the report itself, which will be found as above mentioned.

Now, as to my own experience, it was in the year 1827 that I first used saltpetre in any quantity, and as it is my constant practice to try every artificial manure by some standard of known value, I manured part of 14 acres of seeds in the autumn of 1826 with 10 cart-loads of good dung per acre, leaving a portion in the centre of the field to be dressed with saltpetre in the following spring. The decomposition of the dung,

and the protection it had afforded during the winter, caused the clover thus manured to be very rank and forward in growth, and far superior to the unmanured part, which looked weak and bare. I however waited till the clover had just begun to grow, and then, after having reduced the saltpetre to a fine powder, it was sown by hand on the land left for that purpose. In about a fortnight from that time I went to examine it, and could see distinctly where the saltpetre had been used: it already surpassed the part manured with horse-dung in the breadth of its leaves, and richness of its colour, which was changed to a very dark green, and it continued through the season to grow with a luxuriance of vegetation that produced a very large crop of clover, quite equal, if not superior, to that of the horse manure; nor could we distinguish any difference in the value in the succeeding crop of wheat. The saltpetre was used at the rate of 1 cwt. per acre; cost, 26*s*. 6*d*. in London; carriage and sowing included, about 29*s*. per acre. The horse manure from the farm-yard, 10 loads, or 25 yards, at 4*s*. per yard; cartage, 10*s*.; spreading, 2*s*.; making a total of 5*l*. 12*s*. per acre. The expence would have been much increased had not the field been near the farm. The trial was on sandy land of moderate quality. I could add a great number more experiments, which would be but a repetition of the above, and I have used it on spring corn with equal success. I also recommended it to a friend who tried it on oats, barley, and grass, and a few weeks after the application I had an opportunity of inspecting the crops, which were considerably higher and of a much darker green where the saltpetre had been used than the other parts of the fields, and were judged to contain from 8 to 12 bushels of corn more per acre. Its effects were equally striking on the meadow. It was used at 1 cwt. per acre.

Nitrate of potash, according to Thomson, consists of

1 atom of Nitric Acid . .	6·75
1 atom of Potash . . .	6·00
	12·75
Or (in 100 parts) Nitric Acid .	54·34 parts.
Potash	45·66

And it is said by Davy to contain 1 part of Azote, 6 of Oxygen, and 1 of Potassium.

It would be presumption were I to venture an opinion on its mode of operation, nor for our present purpose may it be necessary; a well-authenticated collection of practical facts are of more service and better understood by agriculturists. It may be asked, Do you use saltpetre now? to which I answer, Yes, and, while I

require manure, probably always shall use it, but not by itself. I consider saltpetre to be a necessary constituent and valuable component part of all manures. I can safely recommend its use alone as a top-dressing on all crops, (except wheat, which I have not tried,)* clover and all trefoils particularly, and, as far as my experience goes, as to the best method and time of application, I think it should be finely pulverised and sown with care and regularity on corn or grass, at the rate of 1 cwt. to $1\frac{1}{4}$ cwt. per acre, just when the crops begin to feel the influence of spring, and vegetation is making its first efforts. Its effects then, particularly if the weather is favourable, are as sudden as they are gratifying, and the rapid change in the colour and growth of the crop gives ample and satisfactory proof of its almost miraculous powers.

George Kimberley.

Trotsworth, Surrey, Nov. 18th, 1839.

XXIX.—*Experience in the Use of Saltpetre and Nitrate of Soda as Manures.*—By the Right Hon. Lord Dacre.—Communicated by his Grace the Duke of Richmond, K.G., President.

To the Secretary of the English Agricultural Society.

Sir,

In reply to yours, I have the honour to state, that many years ago (I should think about twenty) I used saltpetre as a manure, for two or three consecutive years. By myself it was applied solely to grass-land. The land is not favourable to pasture: it has been an old park, and the grasses not of the best quality. The effect was decidedly good: the produce, considering the nature of the soil, abundant; but I, at that time, thought that it produced a heavy crop, at the expense of the finer herbage; and, under that impression, combined with its rise of price, I abandoned the use of it. I have since resumed it, and I remain now of opinion that saltpetre does not, in effect, injure the finer herbage further than by checking its growth for the time by the weight of the stronger grasses.

I last year made the experiment of the effect of the nitrate of soda, by applying an equal money-cost of it between distinct and

* When tried as a top-dressing on wheat, it has been found to increase the bulk of straw; but in many cases to occasion mildew. See various experiments on the use of Nitre and Salt, recorded in 'Dacre's Testimonies;' and in vol. i., ch. 18, of 'British Husbandry.'—F. Burke.

equal portions of land dressed with saltpetre. You may be aware that this nitre is rather more than 30 per cent. cheaper than the saltpetre.* I was absent from home at the hay-harvest, but my bailiff assures me that there was not a perceptible difference between the produce of the saltpetre and the nitrate of soda, applied in such proportions.

I have not myself used saltpetre on arable ground, but I have seen it applied in this neighbourhood as a top-dressing for wheat and barley. It gives great richness to the appearance of each when they are growing; but I doubt the effect upon the yield of the corn: of this, however, I have no positive knowledge.

About 2 cwt. of saltpetre per acre is an ample dressing.

I have the honour to be, Sir,

Your obedient servant,

DACRE.

The Hoo, near Welwyn, Hertfordshire,
January 14th, 1840.

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* Nitrate of soda is found in layers on the surface of the earth in the western part of South America, and is brought on mules to the coast, where it undergoes a process of refining, so that it never contains more than 5 per cent. of alloy in the original packages in the Docks of London, while saltpetre, or nitrate of potash, has come over from the East Indies, and Turkey with from 30 to 50 per cent. of alloy; it is always bought, however, by the dealers at a price calculating the refraction as alloy at 5 per cent., although the quality of the article may differ widely in its proportion of the real salt, and, in order to obtain the full extent of beneficial effects of this saline manure on the land, a genuine and pure article is indispensable. With regard to the price, nitrate of soda in the Docks is now sold by Mr. William Mitchell, of the Commercial Sale Rooms, Mincing-lane, London, at 19*s.* 6*d.* per cwt., duty paid; and saltpetre, or nitrate of potash, at 25*s.* per cwt., duty paid; calculating the refraction at 5 per cent. Saltpetre is now cheaper than it was last year, and the nitrate of soda 10 per cent. dearer; but, having been found on trial on the same soils to be equal in its effect with saltpetre, towards March both will probably advance in price, when the great consumption is likely to take place; and considering the prices of grain, and the generally known results of the manure of saltpetre for the last twenty years, it is very probable that, in spite of the disparity of price, both articles will be largely used for further experiments on the different soils. I have sold during the last year nearly 2000 tons of nitrate of soda, and the present stock in the Docks in London is under 1000 tons: of saltpetre, we have 4000 or 5000 tons in the Docks, but a demand of 1500 to 2000 tons for agricultural purposes would raise the price too high for its use.—[Note by H. F. TIARKS, Esq., Consul-General to the Grand Duke of Oldenburg, and Merchant in the City of London.—Communicated by his Grace the Duke of Richmond.]

XXX.—*Experiment on the Application of Nitrate of Soda as a Manure.*—By the Right Hon. The EARL OF ZETLAND.

To the Secretary of the English Agricultural Society.

SIR,

I HAD the honour to receive your letter of the 2nd instant, intimating a wish that I would send a statement of the details of the experiment tried by me in the application of nitrate of soda for manure, for the purpose of insertion in the Journal of the English Agricultural Society.

I have had so little experience in the use of that manure that I do not think the details which I can give would be worth inserting in that Journal; nevertheless, what I do know is quite at your service. In May last I sent a ton of the nitrate of soda from London to Upleatham, in the North Riding of Yorkshire. I directed that it should be tried on wheat, turnips, and meadow-land, at the rate of 1¼ cwt. per acre. I am now of opinion that it was too late for wheat; for, although it appeared to make the straw grow stronger, I do not believe there was any material increase in the quantity of grain over the adjoining land which was not manured. For turnips, I consider it entirely failed, and was of no use whatever; but, on the meadow-land, its effects were astonishing. In the course of nine or ten days after the application it could be seen to an inch where it had been sown; and, on mowing the field, 90 square yards were measured, and the grass carted off as soon as cut, and weighed; the weight was 30 stone, of 14 lbs. to the stone. The same quantity was then measured off that part of the field immediately adjoining, which had not been dressed with the nitrate of soda; that part was cut and weighed in the same manner, and the weight of it was only 14 stone. I must add that the land was of precisely the same quality in the same field, and the whole field had been equally well manured in the winter with good farm-yard manure.

I afterwards had it tried on several meadow-fields after the hay had been carried, and the effect was very soon visible by a great increase in the growth of the after-grass; and both cattle and sheep seem to eat it greedily.

Whether the effects are of longer duration than one year, of course I am unable to state.

I have the honour to be, Sir,
Your obedient servant,
ZETLAND.

Aske, near Richmond, Yorkshire,
November 29th, 1839.

XXXI.—*Experimental Results on the Use of Nitre as a Top-dressing for Growing Crops.*—By JAMES EVERITT, Esq.

To the Secretary of the English Agricultural Society.

SIR,

I MOST cheerfully undertake to answer your application for a statement of the results I have obtained from the use of saltpetre as a manure; or, more properly speaking, a top-dressing for growing crops. It would be rather presumptuous (having used it two seasons only) were I now to hazard a definite opinion as to its permanent advantage to agriculture; this can only be determined by testing and accurately ascertaining the average results for a succession of not less than seven seasons; but, as far as my limited experience will allow me to form a judgment, I will venture to predict that, upon all *light warm soils,* it will ultimately be found to be beneficial as well as profitable: on the contrary, I have reason to believe that, on *cold clay-land,* on an average of seasons, it will not more than repay the outlay. I give these opinions not simply from my own experience, but in accordance with the information I have collected from some extensive farmers, both upon light and strong lands, upon whose accuracy in ascertaining its results I can confidently rely. I will now detail the particulars and results of the two trials I have already given it; perhaps I ought to premise that much the greater part of my occupation (1100 acres, the property of the Right Hon. Earl Spencer) is light land, with but a small portion of clay. In the first week in April, 1838, I sowed by hand part of a field of wheat, of good light land, at the rate of 1 cwt. per acre, of East India saltpetre (nitrate of potash), for which I paid 26*s.* 6*d.* per cwt. Its effect was very visible in the course of a week, and continued very superior to that part left unsown quite up to harvest. I then had two rigs (as we term them) reaped, and kept distinct, each containing rather above 1¼ acre: the result, upon threshing, was, that I obtained an increase in favour of the saltpetre of 6½ bushels per acre, besides a considerably greater weight of straw: as I did not weigh it, I cannot accurately state the extent, but I believe I am not overrating it at one-sixth, In the first week in May, 1839, I sowed part of a field of wheat (my strongest land), and at the same time part of another field of oats (light land), with 1 bushel (about ¾ cwt.) per acre of American nitre (nitrate of soda), which cost me 23*s.* 6*d.* per cwt., or about 18*s.* per acre. I adopted the same precaution as I did the previous year; and the increase in favour of the nitre was, upon my wheat, not quite 4, and on my oats rather more than 15 bushels per acre; the difference in weight of straw (in this instance I weighed it) was

11 cwt. per acre. From these results, valuing the wheat at 8*s.*, and the oats at 3*s.*, per bushel, it is very evident that, in every instance, I have received a very ample return for my capital employed; the variance in the produce of the wheats I attribute to the nature of the soil, taken in conjunction with the cold wet summer we experienced in 1839: this, in a great measure, is the ground upon which I assume it is more calculated for light than strong soils. I have the opinion of a very eminent professor of chemistry, that he believes the American is better calculated for agricultural purposes than the East India nitre. Not yet having experimentally ascertained their relative effects, it is impossible to say to which I give the preference; but I have been informed by one gentleman who took that trouble, that he found the difference very trifling. I should much have preferred it if some person of more influence and greater experience than myself would have furnished you with information upon this subject; nothing but a sincere and anxious wish to contribute my humble efforts to increase the produce of our native soil, upon which so much depends the future prosperity of every landlord and tenant, could have induced me to offer these observations to the Agricultural Society. Of this you may be assured, that herein I have stated nothing but what I personally know to be strictly true: if I had, in any one instance, by false representation, practised a deception upon my brother farmers, instead of the friend I profess to be to agriculture, I should be its greatest enemy. In conclusion, I would say to every one engaged as I am, be cautious in your first trials, more particularly to those who farm upon clays. But, to convince you that I entertain a very high opinion of its efficacy and remuneration upon light lands, I have this week purchased 5 tons, which I intend sowing upon my crops in the spring of 1840.

I am, Sir,
Yours respectfully,
JAMES EVERITT.

North Creake, near Fakenham, Norfolk,
November 23, 1839.

XXXII.—*Considerations on the Rotation of Crops.*—By John Towers, C.M.H.S.

The very valuable introductory paper on the present state of the science of agriculture in England, from the pen of Philip Pusey, Esq., M.P., cannot fail to excite the deepest interest in all men of intelligence, who have at heart the prosperity of British husbandry. The facts elicited and the prospects held forth in the course of the eleven first pages are calculated to arrest the attention and to stimulate the exertions and hopes of every one; for by the experience of the past they give assurance of the future, and require no comment. But the observations which we find in pp. 12-14 inclusive must not be passed over in silence, for they refer to those operations of " succession or rotation" which are of little less moment than the quality and due preparation of the land.

In allusion to the " four-course " system it is stated at p. 13 that, " though the Norfolk, or alternate, or four-course system of husbandry has conferred such great though silent benefits on the country, it may be doubted whether that system have not accomplished all that it is capable of, and must not pass into another. Already it has begun to fail in one of its green crops, probably in the other."

I have collected some evidence in proof of this startling position, subsequent to the perusal of Mr. Pusey's article, and shall allude more particularly to it hereafter, but before doing this I beg to submit to the English Agricultural Society the scheme of a system of rotation which once excited great attention in France.* I met with it some years since in Loudon's Gardener's Magazine, vol. ii., introduced by a letter of the venerable projector (a native of our country, though residing at Paris), to the editor, from which the following is an extract:—" I now send you a farming scheme made for the French government soon after the revolution, with a view to show them how they might cultivate 100 acres of land with only 2 horses. The Directoire approved of the system, and wished to have it published, as did my worthy friend, the late M. Thouin. It was then the custom in France to sow about 70 seeds to every square foot, and, as I proposed to sow only one quarter of that quantity, the proposal was very acceptable to the Directory, who were in dread of a famine."

The other parts of Mr. Blaikie's communication are not important. The address and date, Paris, Rue de Colisée, No. 23, July, 1826.

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* This rotation would only be applicable to the richest soils, and where manure can be obtained in great quantities.—Richmond.

MR. THOMAS BLAIKIE'S SCHEME OF ROTATION UPON A FARM OF 100 ACRES, PROPOSED TO THE FRENCH GOVERNMENT.

First Year. Acres.	Second year. Acres.	Third year. Acres.	Fourth year. Acres.	Fifth year. Acres.	Sixth year. Acres.	Seventh year. Acres.
30 Wheat*	5 Turnips 5 Cabbages 2½ Field beet 2½ Carrots 10 Potatoes 3 Vetches 2 Beans	10 Oats 5 Barley 15 Wheat	15 Clover 5 Turnips 5 Cabbages 2½ Field beet 2½ Carrots	15 Wheat 10 Oats 5 Barley	10 Potatoes 3 Vetches 2 Beans 15 Clover	30 Wheat
15 Clover	15 Wheat	10 Potatoes 3 Vetches 2 Beans	30 Wheat	5 Turnips 5 Cabbages 2½ Field beet 2½ Carrots	10 Oats 5 Barley	15 Clover
5 Turnips 5 Cabbages 2½ Field beet 2½ Carrots	10 Oats 5 Barley	15 Clover		10 Potatoes 3 Vetches 2 Beans	15 Wheat	5 Turnips 5 Cabbages 2½ Field beet 2½ Carrots
10 Oats 5 Barley	15 Clover	15 Wheat	10 Potatoes 3 Vetches 2 Beans	15 Wheat	5 Turnips 5 Cabbages 2½ Field beet 2½ Carrots	10 Oats 5 Barley
10 Potatoes 3 Vetches 2 Beans	15 Wheat	5 Turnips 5 Cabbages 2½ Field beet 2½ Carrots	10 Oats 5 Barley	15 Clover	15 Wheat	10 Potatoes 3 Vetches 2 Beans
10 Lucern,† which lasts seven years, and is then ploughed down, and succeeded by wheat.						

* It can only be fine land that will bear three crops of wheat and one of barley or oats, besides potatoes and cabbages, within seven years. It would also require more manure than is usually raised upon the generality of farms.—F. Burke.

† Lucern, it should be observed, requires a light, but fertile, soil, and a southern climate.—F. Burke.

In presenting the foregoing table, candour requires that I acknowledge to have on more than one occasion communicated it to the public through other channels, for I was struck with its apparent comprehensiveness. I also sent a copy to the editor of the Quarterly Journal of Agriculture, submitting it to his judgment whether to publish it or not in that able periodical. He however thought it inapplicable to Scotland, more especially as lucern was not found to prosper in North Britain.

I do not conceive myself fully qualified to offer any strong opinion upon the applicability of the entire rotation to the farms of the southern and midland counties; nevertheless, when the numerical extent of the crops, the precision and order of their arrangement, and the proportion they bear one to the other, are viewed in connexion with the facts that clover begins to give way, and that the turnip deteriorates when each follows in a frequently recurring rotation, we can scarcely fail to perceive the basis of much improvement in the plan suggested by the veteran Blaikie, whose experience had, at the time he wrote, extended to "above three quarters of a century."

If it be permitted, when considering the operations of the field, to take advantage of the analogy afforded by those of the garden, much light will be thrown upon the order and agency of rotation. In the latter, particularly when the substratum of a soil is chalky, the leguminous crops must not follow in frequent succession: the pea furnishes the strongest proof of the fact; for not only is the land so soon saturated with its fecal excretions as to refuse to bring a crop to perfection, but it is found to emit a powerful and specific odour which cannot be mistaken; yet it is proved that, if peas be grown between two vegetable crops—one a perennial and herbaceous plant, as the strawberry, and the other an annual gross feeder, as the cabbage or broccoli—they may be sown year after year with perfect safety and success.

It is also found, experimentally, that the cabbage tribe rotates admirably with the potato in all strong hazel loams, for years in succession, without deterioration. If the scheme proposed by Mr. Blaikie be attentively viewed, and compared with the well-balanced succession of crops which keeps a good garden in high condition, with a very moderate supply of putrescent manures, it must be perceived that each successive crop is remedial, and serves as an antidote to its predecessor. I therefore offer it to the Society as a subject for trial on experimental farms—one from which much improvement in practice may be derived, but not by any means as a precise model. At present it lies dormant in the pages of the Gardener's Magazine, for 1830; but, if permitted to appear in the Journal of our new, and I trust most eminently useful, Society, it may also attract the attention of experimental

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agriculturists, whose desire it is to ascertain facts, and become independent of mere routine. Whatever be thought of the course of cropping indicated by Mr. Blaikie, it will scarcely be doubted that, in proportion as the order of the rotation shall be comprehensive, and its crops opposed to each other in their physical organization, so will be the economy of the manure, and its energy in promoting vegetation. This I have seen exemplified yearly in the garden, where the minimum of manure, and that composed chiefly of semi-decayed beech-leaves, has produced a great abundance of fine vegetables of every description, excepting carrots, which rarely spindle well in a gritty and compact loam.

The rotation of the garden affords likewise the strongest analogical proofs of the theory of the radical exudation. Mr. Pusey has alluded to this theory at p. 12, where he observes that "crops of the same kind, following each other, become rapidly less productive, whether* by exhausting the land of some fertile property, or by depositing, as has lately been supposed, some excrementitious matter injurious to the growth of their own species, though favourable perhaps to the luxuriance of some other tribe."

For this theory we are, I believe, indebted to Professor De Candolle, of Geneva; though Brugmans had previously intimated that a certain portion of the juices absorbed by plants were ejected by their roots, after their vessels had separated the salutiferous or nutritive parts of those juices. De Candolle's hypothesis is comprehensively described in the 21st Number of the Quarterly Journal of Agriculture. Improving upon the idea of Brugmans, it perceives in this exudation of fecal matter the true theory of the rotation of crops; that this exuded substance may be regarded in some measure as the excrement of the preceding crop of vegetables, which proves injurious to succeeding vegetation. "The particles which have been deleterious to one tribe cannot but prove injurious to plants of the same kind, and probably to those of some other species, while they furnish nutriment to another order of vegetables. Hence, why one kind of corn-crop is injured by immediately succeeding another of the same kind; hence, why different kinds of crop may with advantage succeed one another; hence, in short, the propriety of a rotation of crops."

Subsequently, we find that M. Macaire made several experiments with chemical re-agents upon plants of *Chondrilla murali*

* The query is well put, and merits experimental inquiry. For my own part, although not meaning to impugn the justice of De Candolle's theory, I must confess that I am somewhat sceptical on the subject; and in that I believe many intelligent farmers concur.—F. Burke.

Mercurialis annua, &c., after washing their roots thoroughly, and placing them in phials of pure water.* He obtained results which proved indeed that the roots, so raised and washed, absorbed and ejected certain chemical solutions; but it must be admitted that a plant of any species, when lifted from its earthy bed, is no longer in its natural situation; it becomes susceptible of the agency of foreign substances, which would have been wholly inoperative had it remained quiet and undisturbed. It has ever appeared to me that pure chemistry cannot be legitimately employed to discover or interpret the phenomena of the vital principle: its sphere of action is the analysis of dead or effete matter, and the development of its constituents; for that which destroys life cannot interpret the living functions: therefore, all experiments upon vegetables, by plunging their roots into solutions of lead, oxalate of ammonia, and lime-water, though they lead to certain chemical results, must be considered delusive, inasmuch as the exposed and unprotected fibres are placed in media quite foreign to their nature, and destructive ultimately of the vital principle. While growing in soil, a plant is in its native element, protected and defended; it is in a medium wherein it can exert all its vital functions. A young and tender balsam will live, and in a degree thrive, though the mould of its pot be frequently watered to saturation with a diluted solution of muriate of iron; but, raise the plant, and immerse its roots in that same solution, and it will perish in an hour; though, previously, the soil have assumed the appearance of rust of iron from the quantity of oxide which it has separated from the water during the course of a fortnight.

Thus it appears that no correct inference can be deduced from any phenomena which are discoverable in plants, or portions of plants, when they are acted upon by chemical agents, in situations which are unfavourable to the due performance of the vital functions. Under the impression of this fact, I was induced to take that view of the theory of radical exudation which I made public in the first edition of the 'Domestic Gardener's Manual;' and which every subsequent observation has tended to confirm. This I may now be permitted to state in few words, as I think it may in a degree corroborate the theory for which the agricultural world is now so much indebted to the talented professor of Geneva.

I had observed two plots of raspberry-bushes, the soils and subsoils of which were very dissimilar, and situated some miles apart; these I compared with a plantation of my own. The

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* Chondrilla *muralis* is the Common Gum-Succory (which in the 'Hortus Britannicus' of Loudon, is Chondrilla *juncea,* or rush-leaved).—Mercurialis annua is the annual Herb-Mercury.—The Author.

two plots showed remarkable health, though the plants of each assumed a very different mode of growth. On the one (No. 1), every shrub was sturdy, but not tall, and its foliage beautifully verdant. In the other (No. 2), the canes grew to the height of eight feet, or more; the surface soil of the garden was shallow, resting on a bed of chalk. These plants "gave in:" and hardly a cane three feet high was left in the following year.

The stout plants of the other garden—the soil of which appeared to be a hazel loam over shaly stones—continued to flourish, and bore excellent fruit. My plants deteriorated gradually, though the soil was deep, and every effort was made to keep it in heart. I ascertained that the stout plants of the garden No. 1 were never permitted to occupy the same site during a longer period than five years; and that new beds were formed in regular succession by planting strong suckers in parts of the garden remote from the bearing beds, which, at the termination of the assigned period, were grubbed, cleared of roots, and put under some vegetable crop.

Comparing these facts, I arrived at the inference which I stated in the following terms:—"Particular plants convey into the soil, through the channels of their reducent vessels, certain specific fluids, which, in process of time, saturate it, and thus render it incapable of furnishing those plants any longer with wholesome aliment: in fact, the soil becomes replete with fecal and excrementitious matter, and on such the individual plant which has yielded it cannot feed; but it is not exhausted; so far from that, it is, to all intents and purposes, manured for a crop of a different nature: and thus, by the theory of interchange between the fluids of the plant and those of the soil, we are enabled, philosophically, to account for the benefit which is derived from a change of crops."—(Domestic Gardener's Manual, 1830, p. 397.)

Wholly ignorant at that period of the hypothesis of De Candolle, or that this philosopher had penned one word on the subject, I arrived, it should appear, at a corresponding deduction from facts. Subsequent observation has afforded proofs corroborative of the theory, while it has presented the means to interpret the doctrine by reference solely to natural agents and the vegetable vital principle.

1st. If we investigate the soil wherein a rank crop of any kind has grown, we shall rarely fail to detect the presence of a more or less powerful specific odour: this is traceable upon turning over the surface of a cabbage or broccoli bed, or that in the vicinity of a row of peas, beans, or kidney-beans; all the *brassicas,* and many *leguminosæ* (that is, of the *cabbage,* and many of the *bean* tribe) afford clear evidence of this fact; and the only inference that can be drawn from it is, that the ground is imbued with

substances or gases derived from, or emitted by, the roots. Persons who are inclined to doubt may readily satisfy themselves of the correctness of the statement by sowing a small quantity of peas, beans, or cabbage, in a box or seed-pan, employing the simplest light loam they can procure. After a time, when the plants shall be grown of a size fit to be removed, the earth, upon stirring it, will be found saturated with the peculiar scent which is distinctive of each species. Every vegetable, to a greater or less extent, operates in a like manner, diffusing through the ground certain substances which may justly be viewed as fecal or excrementitious, whether they consist of gaseous or fluid exudations, in the strict sense of the term, or merely of exfoliations or fibrous matter separated from the roots. The positive and specific odour is the first proof of this fact; connected with which is the deepened shade of colour imparted to the earth.*

2nd. The operation of decomposable manures offers the second proof presumptive of the excretory functions of vegetables. All these manures contain, or are resolvable into, the substance now called humus, of which charcoal (carbon) is the chief constituent and the source of colour. Carbon, oxygen, hydrogen, occasionally azote, are the ultimate elements of humus, and of all vegetable dead matter. These elements are susceptible of an infinite variety of modified combinations, when governed by the vital principle, under the stimulus of the great natural agents.

Manures, therefore, are the pabulum of vegetable life; they feed and support it: if then there be no antagonist principle in operation, the due and proportionate application of manure would, as far as food is concerned, bring every plant to perfection which is placed in a bed of earth adapted to the structure of its roots. But manure (the most perfect humus) fails to nourish; it does not, and cannot, support a crop of any individual vegetable which follows in continued or even too frequent succession;† and therefore it is clear, to demonstration, that exhaustion is not the cause of failure.

3rd. But plants which dwindle when so circumstanced, however high may be the condition of the land, succeed perfectly, and produce ample crops, when they follow others in the order of due rotation. Here, then, we perceive that nature furnishes ample

* I cannot say that I have myself ever remarked this peculiar odour, and I think it would be difficult to find any perceptible difference between the scent of a barley or a wheat stubble; though it is not improbable that land from which a rank vegetable crop has been removed, may be imbued with the smell of the decomposed roots and leaves which have rotted in the soil.—F. Burke.

† Is not this contradicted by the fact that beans and wheat, as well as beans, cabbages, and potatoes, though planted successively for years together, will produce fine crops, if the land be good and well manured? —F. Burke.

proofs of the excretory functions of plants; and, therefore, we have no occasion to call in aid the analytic powers of chemistry.

The only plausible argument that has been adduced against the theory is that of the exhaustion of the soil. It is supposed that each individual plant selects its own peculiar aliment, and therefore that rotation economises manure, and provides the supply of the several crops in due and successive order. It is quite certain that plants elaborate a certain proper juice, and effect specific characteristic secretions; but all these secretions, be they farina, starch, sugar, gum, or odorous resin, are merely modifications of the four grand elements, oxygen, hydrogen, carbon, and azote; and there is not perhaps one solitary fact which leads to the belief that the common or raw sap imbibed by the roots contains any characteristic principles. This is usually supposed to be little more than water, holding carbonic acid in solution; a fact which, assuredly, cannot be determined by experiment, but at the same time is more in accordance with electro-chemical principles than the opinion that each individual plant deprives the soil of some sort of aliment peculiar to its own habits and constitution. Exhaustion is certainly effected by vegetable action, but to understand the term aright we must consider that the earths proper undergo little or no change; that all manures (or humus) are resolvable into the elements of vegetable substance; and, therefore, are elaborated by the vital energy of plants into sap, and in that state are absorbed by their roots. All decomposable matters can be and are thus gradually removed from the earths with which they have been incorporated by the labour of man, and, so far, the land may become exhausted; but any one individual plant will cease to thrive if repeatedly planted in the same spot long before this state of exhaustion shall be brought about; the ground itself becoming at the very time imbued with that peculiar odour which indicates the excretory power of the roots.*

* Although it is not improbable that the observations lately made on this subject by M.M. De Candolle, Macaire, and other vegetable physiologists and chemists, may be attended with future benefit in regard to a more regular course of cropping in the alternate system, yet the main object of cultivation, besides the necessary attention to the management of the soil, must ever consist in supplying the land with a sufficiency of manure to prevent it from being impoverished. "The main object of all rotations should therefore be, to establish such a series of crops as, by preventing the too frequent recurrence of any one of those which are considered exhausting, shall guard against the dissipation or loss of those component parts, or qualities of the soil, which seem peculiarly adapted to the growth of each, and in the abundance of which consists its fertility. The precise nature of those qualities, or rather the causes which influence their peculiar effect on plants of different species, has not been ascertained; indeed, has been only vaguely conjectured; and all the researches of chemical science on the subject have ended in proving little more than what was already known by experience; viz., that certain plants can only be grown with ad-

To recur to Mr. Pusey's observation on the incipient failure of the "four-course" system, I beg to allude to an existing fact, which bears directly on and confirms that gentleman's statement. A neighbouring farmer, with whom I am well acquainted, and whose fields almost join my own property, had, in the late summer, a noble breadth of barley, of full 40 connected acres, with broad clover. In the centre of this piece, a strip of about 3 or 4 acres was sown in the autumn of 1837 with *trifolium incarnatum* (crimson clover). The terrible frost of January 1838 (2° below zero) cut this plant into patches, but by far the greater portion grew, and bloomed, though it always was dwarf. The farmer assured me that, as respected manure, the piece was the richest of the field. The barley of this year was in every part fine alike, and was safely harvested about the close of August. From that time the clover began to grow freely, but it became apparent that the plant which was on the small portion of the field that had been under *trifolium incarnatum* in 1838 was comparatively weak. A foot-path crosses this piece through its whole length, diagonally, so that every part of it is brought into sight. The stubble of the barley is now, and has been for weeks, surmounted by the rich herbage of the clover in every part of the extensive breadth, with the single exception of the trifolium piece; there it is seen still high above the clover, marking, as by a boundary line, the exact limits of the piece.

The proprietor ascribes the weakness of the present crop entirely to the trifolium, though he does not reason on the subject as in any way connected with the theory of radical exudation.

One other circumstance only remains to be mentioned. Here and there one may perceive an irregular patch of clover overtopping the barley-stubble, and looking verdant as the plant of the great breadth. I would not take unwarrantable advantage of a fact whereon the memory cannot retain sufficient evidence; but certain it is that the trifolium perished in patches, and it would not be unfair to conjecture that the places so left bare were not poisoned for clover by the fecal exudations of the previous crop.

I offer the foregoing remarks with all due humility, and in the hope that they may induce further inquiry into the philosophy of the great law of Rotation.

JOHN TOWERS.

November, 1839.

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vantage on certain soils, and can only rarely be continued without evident diminution of their amount. Yet the 'Theory of the rotation of Crops' still holds out a wide field for research; and, if followed up, bids fair to solve the problem of vegetation." See vol. ii., ch. 6 and 7 of 'British Husbandry;' in which will be found extracts from Von Thaer's luminous essay on soils and rotations, translated from his '*Principes raisonnés d'Agriculture.*'—F. BURKE.

Note by the Rev. W. L. Rham.

The following rotation, which has been adopted, and religiously adhered to, in the neighbourhood of Lille, before any of the present generation were born, is given in the notes to the last edition of the 'Theatre d'Agriculture' of Olivier de Serres, p. 184; published at Paris in 1804.

The quantity of land is 15 bonniers (about 60 acres); each bonnier is divided into 16 cents: each cent is, consequently, nearly $\frac{1}{4}$ of an English acre.

ROTATIONS OF CROPS FOR FOUR YEARS.

First Year.

Bon.	Cent.	
0	12	Colsa plants
0	6	Turnips
0	6	Cow cabbage
4	8	Wheat
1	0	Clover
0	8	Flax
2	8	Colsa
0	8	Beans
1	8	Oats
1	0	Rye & Tares
0	8	Rye
0	8	Winter barley
0	8	Clover
0	4	Potatoes
0	2	Beet root
0	2	carrots
15		

Second Year.

Bon.	Cent.	
1	8	Oats
1	0	Tares
0	8	Rye
0	8	Winter barley
0	8	Clover
0	4	Potatoes
0	2	Beet root
0	2	Carrots
0	12	Colsa plants
0	6	Turnips
0	6	Cow cabbage
4	8	Wheat
1	0	Clover
0	8	Flax
2	8	Colsa
0	8	Beans
15		

Third Year.

Bon.	Cent.	
0	1	Clover
0	8	Flax
2	8	Colsa
0	8	Beans
1	8	Oats
1	0	Tares
0	8	Rye
0	8	Winter barley
0	8	Clover
0	4	Potatoes
0	2	Beet root
0	2	Carrots
0	12	Colsa plants
0	6	Turnips
0	6	Cow cabbage
4	8	Wheat
15		

Fourth Year.

Bon.	Cent.	
4	8	Wheat
1	0	Clover
0	8	Flax
2	8	Colsa
0	8	Beans
1	8	Oats
1	0	Tares
0	8	Rye
0	8	Winter barley
0	8	Clover
0	4	Potatoes
0	2	Beet root
0	2	Carrots
0	12	Colsa plants
0	6	Turnips
0	6	Cow cabbage
15		

4 8 Wheat

See also the rotations in 'Outlines of Flemish Husbandry,' p. 25.

It will be observed in this table that, except in the case of a small portion of rye and winter barley, most of which is cut green for the cattle, every plant is succeeded by one of a different family.

The principal objects of cultivation are wheat, rape-seed (from which oil is expressed), and flax; and these occupy exactly one half of the land. The other half is devoted to roots and green crops for the cattle, which are necessary to produce the manure required for the principal crops, and to keep the land in good heart.

Here simple experience, without science, has anticipated the rules which have been since proved to be most advantageous; and a perfectly scientific rotation is the result of long experience and attentive observation alone.

This system must have been noticed by every observant traveller, and has been mentioned in many publications. Yvart, in his excellent work 'Succession de Cultures,' which forms the whole of the 12th volume of the 'Nouveau Cours complet d'Agriculture' (Paris, 1808), continually alludes to it; yet nowhere has it been followed but where it was first adopted. It has scarcely been noticed in English agricultural publications; and if some individuals, who read foreign agricultural works for their own satisfaction, have known it, they had no good opportunity of communicating the information to the English farmer, for want of a vehicle such as now presents itself to all important aud useful communications, in the Journal of the English Agricultural Society.

W. L. Rham.

Jan. 27, 1840.

XXXIII.—*Experiment on Narrow and Wide Drilling of Wheat.* Communicated by Thomas William Bramston, Esq., M.P.

To the Secretary of the English Agricultural Society.

Sir,

The comparative advantage of narrow and wide drilling occupied much attention in many parts of Essex in the year 1838. I send you the result of an experiment, carefully made by Messrs. Dixon, in the neighbourhood of Witham, who farm highly. If you think the details are of sufficient interest to deserve publication, I am authorised to say they are much at your service.

I am, Sir,
Yours faithfully,
T. W. Bramston.

Skreens, near Chelmsford, Essex,
December 8th, 1839.

Trial of narrow and wide drilling of Wheat, sown on the 16th of Oct. 1838.—The quantity of land drilled was 3 roods and 37 poles; half of which was drilled with 13 rows on a stitch, 10 feet wide, the other half with 19 rows on the stitch; the land being divided into 4 stitches.

The same quantity of seed was used; viz., at the rate of 3 bushels per acre, which produced, from the

	Bsh.	pks.		Sts.	lbs.
19 rows, 348 sheaves...	23	1¾	...weighing (nett)	106	8
13 rows, 374 sheaves...	21	0¾	...weighing (nett)	96	8
Bushels...	2	1	Stones...	10	0

The 4 stitches were alongside of each other, and were all cut by the same men, and no perceptible difference in the size of the sheaves.

The 13 rows did not stand so well as the 19 rows, but were a shade the better sample, weighing about one-sixth of a pound per bushel more.

The soil was mixed. The sort of wheat was Golden Drop.

XXXIV.—*Practical Essay on the Diseases of Sheep.*—To which the Prize of Ten Guineas was awarded by the Saffron-Walden Agricultural Society, in Sept. 1839.—By HENRY CLEEVE, of Rawreth Hall, near Rayleigh, Essex.

[Communicated by the Right Hon. Lord Braybrooke, President, and the Committee of the Saffron-Walden Agricultural Society, as the best practical Essay on the Diseases of Sheep, for the Prize offered, in 1836, by Henry John Adeane, Esq., one of the Vice-Presidents.]

THE most convenient way for a practical man to convey practical information in a compendious form is to disclaim all pretensions to scientific arrangement. Farmers are not always men of leisure, and their literary pursuits are too limited by opportunity to admit of their studying many branches of knowledge essentially connected with their business. Among these may be included comparative anatomy and the pathology of the animal creation.

It is proposed therefore to enter into a succinct enumeration of the diseases of sheep, a short explanation of their causes and symptoms, and a description of the treatment which I have either from my personal experience found successful, or have understood to be so on the authority of intelligent friends. I shall add a few remarks on the selection of stock and the more important points connected with breeding.

Some of the diseases of sheep are almost peculiar to them, and comparatively unknown in other descriptions of stock: others arise from accidental causes, to which all animals are equally liable, with slight variations as to the symptoms. So far it seems expedient, with a view to clearness and precision, to arrange my subject. I will therefore insert them in the following order:—

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WATER IN THE HEAD is often confounded with the next disease to which I shall refer, namely, turnsick, or goggles; but the two complaints are essentially different. Water in the head is more

frequent with lambs than with adults; indeed it very rarely occurs except in lambs. It consists of an accumulation of fluid in the ventricles, or between the membranes that envelop the brain. It is perhaps hereditary, and is most generally caused by poverty of blood, or, in other words, general debility in the ewe, arising from insufficient feeding. The symptoms are dulness, want of appetite, enlargement or, rather, distension of the skull, and a heavy languid appearance of the eye, which sometimes projects unnaturally. It rarely admits of cure, unless by the natural supply of abundant milk from the mother, or from a foster-mother, with the administration of aperient and tonic medicines. The lamb generally dies from weakness. My principal motive for describing the complaint is to caution the farmer against breeding again from the mother.

Turnsick, or Goggles, is sometimes termed by shepherds the Giddy, or the Dunt.* This is also a complaint of the head, but affecting sheep more than lambs. It is essentially different from the last disorder in its symptoms as well as its cause. It usually appears when the sheep is about attaining its first year, though it is by no means confined to that age. It proceeds from the presence of hydatids in the brain. They are lodged in a

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* Vancouver, in his Survey of Devonshire, thus describes the Goggles in Sheep :—

"The symptoms are more discoverable in the morning, when the animal first rises from the ground, by an evident weakness and difficulty in raising its hind quarters. This complaint continues for some time, getting worse and worse, until the animal can move its hind parts no longer; it then lies prostrate on the earth, but looking constantly backwards, and making continual efforts to bite and nab the wool towards the loins, and where there is evidently seated a most excruciating pain. In this condition the animal very soon expires. No remedy or means of prevention have as yet been suggested to avert this deplorable malady."

Should I have been mistaken in classing Goggles and Turnsick under one head, I think the term "Goggles" must be misapplied, and those provincial terms are very confounding. What Vancouver has described appears to me to be a paralytic affection. I recollect the complaint, but never heard it named the "Goggles," the term "Shrew-croft" being commonly used to designate the disease.—The Author.

I have seen a great deal of this affection in our own neighbourhood, and have had my own flock seized with it several times. The easiest and most effectual way not only to cure it, but to prevent its progress, is to take some common tar and place it between the eyes of all the sheep, spreading it down to the nose, and it is astonishing to find how soon they recover; nor will any of the other sheep, having the tar applied in this manner, be liable to have the complaint.—William Greaves.

[This and the other notes of Mr. Greaves of Bakewell, (a Derbyshire tenant of his Grace the Duke of Rutland), who has had considerable experience in the diseases of horses and cattle, and paid much personal attention to the management of his own stock, are communicated by his Grace the Duke of Richmond and the Marquess of Downshire.]

sac or bladder, filled with a watery fluid, and the pressure of this bladder on the brain occasions the peculiar symptoms by which the complaint is recognised. The affected sheep has a wandering, staggering, and insane appearance; he carries his head on one side, and hence has a difficulty in feeding; he appears absent in mind, and has a circuitous walk, resembling a horse while being lunged. There is an important distinction to be noticed between the symptoms of this complaint and the general indications of cerebral disease. Occasionally the sheep may be properly called delirious. An unnatural wildness, at times almost amounting to ferocity, appears to govern the animal's movements: but here a heavy dull langour is the first apparent symptom. The disorder is slow in its progress, the patient languishes on for many days, and even weeks, and at length dies as if pining away from a low and diseased condition of the system. The eyes are usually prominent. When the animal is driven he takes the circular route I have described. The complaint is not, even in its *advanced stages*, attended by violence or extreme agitation, but rather by an increasing and settled depression of spirits. It is more frequent in wet lands than in high pastures, and especially in undrained soils.*

It is sufficiently obvious from the description of the symptoms that the disease is beyond the reach of medicine. The brain in all the animal creation is very destitute of absorbent vessels, and were it otherwise, it would be difficult to promote the absorbent action by medicine in this case, because the fluid is contained in a closed cyst, and is part of the living animal. Hence the farmer has been led, but with little success, to the adoption of mechanical means for the purpose of opening the vesicle containing the hydatid, and thereby removing the pressure of the fluid on the brain.

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* The author, in his description of the goggles, states that some shepherds call it the giddy, and this is the term which we employ in Berkshire. The best means of prevention, with which I am myself acquainted, is to make a judicious crossing of blood from different well known stocks. The goggles is a disease of quite a different character; the first symptoms of it are the following: the animal begins rubbing the wool round the tail, not turning round as the giddy sheep does, but stumbling along in a straight direction, and as the disease increases, the animal staggers a short distance, then falls down, sometimes on its head and at other times on its side, rolling quite over. In the last stages the teeth turn quite black, and the sheep then soon die. I am of opinion that this disease is infectious. I once knew a flock of 200 sheep, 64 of which died goggly; they were bled, and opening medicine given them, but it did no good.—W. Humfrey. [This and the other notes of Mr. William Humfrey, a gentleman of much experience in the management of sheep, of Boxford, near Newbury, Berkshire, are communicated by the Marquess of Downshire.]

I have no hesitation in saying, that in the few instances in which the rude operations employed for this purpose have been successful, it is to be attributed more to accident than to skill. If it were possible to ascertain with certainty the exact position of the vesicle, the operation of trepanning might be safely resorted to. Mr. Smith, of Southam, is said to have repeatedly performed this operation successfully.* It is to be done by making two incisions, so as to form, when united, the letter T over the somewhat softened part of the skull, supposed to cover the hydatid. Turning the angles of the skin back, by dissecting them from the bone, the latter is now to be pierced by a trephine, and the portion of bone removed. This done, the brain will be exposed, and the hydatid, if at the part, will rise up covered by the *dura mater:* this must also be cut through and turned back, and the parasite punctured with a fine curved needle carrying a thread. As soon as it has shrunk up it may be gently drawn away by means of the thread, and the *dura mater* and skin replaced over the part; the edges of the latter being held together by a stitch or two, and covered with a cap. The portion of the bone must not be returned. A very rude, and, although I have practised it myself, I must say cruel operation, allied to the trepanning principle, has sometimes though rarely proved useful. It is called "wiring," and consists in passing a wire or knitting-needle up the nostril, and through the perforated plate of the ethmoid bone into the brain. This is no certain or easy task, for although the passage is straight, it is narrow, and if the needle deviates from its path in a very slight degree it will be stopped by a projection of the frontal bone from above, or the solid portion of the ethmoid bone below. But, assuming that the perforation is effected, its success must depend on the position of the vesicle; for if it should happen to be situated too superficially, or too deeply, or in fact anywhere out of the direct line of the needle, it will not be punctured, and, of course, the fluid not being removed, the pressure on the brain will continue, while the puncturing is of itself likely to occasion fatal inflammation.

Other attempts of a mechanical nature have also been made, but with yet more doubtful results, and scarcely more humane in their character. Some farmers have cut off the ears after severely wringing them; others have dogged the animal, and worried it to exhaustion. The principle of these and similar barbarous and general experiments is the same—to create that violent and convulsive struggling in the animal that may perchance rupture the

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* Lectures on the Morbid Anatomy of Serous and Mucous Membranes, by Dr. Hodgkin.—vol. i. p. 185.

vesicle wherever situated; a disgraceful, and generally useless, mode of treatment.*

It is probable that in a very large majority of cases where recourse has been had to these violent remedies, immediate death has followed, even where the vesicle has been broken. I can only recommend prevention instead of surgical operation, by selecting as far as possible dry and well-drained pasturage, and paying careful attention to the choice of breeding stock. It is considered by well informed men that the disease is far less prevalent than formerly, and its decline has been attributed to the great improvement in our agricultural system that has, under the patronage of influential men, been made of late years. "Sturdy" is a name often given to this disease, as well as to the last. There is no question however that the two complaints are distinct, and proceeding from different causes, though, affecting as they both do, the same organ, many of the symptoms will correspond. Some degree of difference, however, is to be found in the degree of rapidity with which the disorder advances. Water in the head will sometimes continue for many months before it terminates fatally, but the turnsick, or goggles, properly so called, will occasionally carry off the sheep in a very few weeks.

Apoplexy proceeds from pressure on the brain, by the sudden determination of blood to it, occasioning the rupture of some blood-vessel. In sheep this generally occurs when on the road to market. They are then in high condition, and often overdriven beneath a sultry sun. The drover should carefully watch any sheep that lags behind. If it appears stupid and unconscious, heedless of the dog and forgetful of its companions, it should be instantly and copiously bled from the neck: a prompt flow of blood is indispensable in this case. Every surgeon knows that the loss of the same quantity of blood taken away in three minutes will have much greater effect than will be produced if it is allowed to dribble away in twice the time. If the sheep is on the road to the butcher, nothing further is necessary; but, should it be attacked at home, the shepherd must change its pasture, and keep the bowels freely open by repeated doses of Epsom salts.

This disease, when occurring at grass, the sheep being in high condition and the pasturage luxuriant, is sometimes called the

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* The cruelty of such operations, even if successful, ought not to be encouraged, particularly as from the very nature of the disease the operation may not produce a thorough cure; because the origin and mode of development of hydatids are involved in great obscurity; but though first formed in an unknown manner, they are capable of re-producing their species, probably by germination, and that power is spread over the whole surface of the cyst.—James Dean.

Blood. There is nothing so dangerous as that extreme state of condition to which our sheep and other animals are sometimes brought. When every vessel is filled to the uttermost with blood, those of the brain press upon the nervous system, and life is suspended or lost.

Epileptic Fits sometimes, but not frequently, attack sheep; when they do it is usually in the spring of the year. They are known by the suddenness of their attack, and the giddy, convulsive staggering of the animal. It recovers, however, in the course of a short time, and returns to its food. If the fits recur, treatment similar to that which I have recommended in apoplectic cases will afford relief, though the bleeding need not be so copious, unless the intervals of attack are very short.

Palsy appears to proceed from exposure to severe frost, particularly in lambs soon after their birth, and ought rather to be called chill or numbness, as it has no necessary connexion with direct injury to the nerves, unless in cases similar to those I am about to mention. As the complaint arises from cold, a restoration of warmth, but by a gradual process, will generally remove it.* In the following cases Palsy would seem to have been entirely caused by the food. I had been giving two cart-loads of mangel-wurzel daily to about 150 couples. Finding the pasture get short, I one day ordered an extra load, and the following day I found that 13 of the ewes had nearly lost the use of their limbs. On another occasion, having some hoggets that would not eat the root, I enclosed them in a pen, in order to starve them to it; but, as soon as they began to feed heartily they also were similarly affected. If I rightly attribute the complaint to this cause, and, indeed, I have no doubt on the subject, the treatment is to withhold the mangel-wurzel for a short time, and only to return to the use of it gradually and in small quantities. I bled the animals that were affected, and gave to each an

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* Palsey does *not*, in my opinion, arise from exposure to cold; but, in lambs, is caused by the bad state of the blood of the ewes at the time of lambing. I have known it occur on the dryest as well as wettest soils, in warm as well as cold weather. Two years since, I had about fifty ewes put to the ram early. In consequence of the severe frost, and the turnips being rotten, I was afraid to let these forward ewes have any, and they were kept on hay; the hay being very good, they ate a great quantity, throve very fast, and their blood was in too high a state. Nearly half of their lambs were taken with swelled joints and sore mouths and ears; and, whenever a lamb bit the teat of its mother, it was sure to fester: but, after a time, when they had been cooled and purged by young grass, they recovered, and did very well. Of the remaining 550 ewes that had a few turnips with the *same* hay, no lambs could be more healthy.—John Ellman.

[This and the other notes by John Ellman, Esq., are communicated by his Grace the Duke of Richmond.]

ounce and half of Epsom salts: with one exception they all recovered under this treatment.

Palsy sometimes, but not frequently, proceeds from pressure on the brain caused by the pressure of the hydatid. In such cases, the original disease being for the most part incurable, the palsy that it occasions is equally past the aid of medicine.

RABIES.—When wounds arise, as they often do, from the bite of the dog, some attention is requisite.* It would be prudent to break the fangs of every savage sheep-dog; for the loss to the animal is of no importance, compared with the safety of the flock. It is a good rule, in every case where a dog has severely bitten a sheep, and particularly if he has worried the flock, to extirpate the wounded part without delay, or to apply the lunar caustic to the wound, taking care that it shall come in contact with every part that the poison can have reached. The caustic can be more readily used than the knife. The sooner this is done the better; but no lapse of time should deter us from operating, for, fortunately for the quadruped and the biped, the poison is slowly absorbed.

Whenever rabies appears it is inevitably fatal. It admits not of even temporary relief. Agitation almost amounting to ferocity, indescribable wildness of manner and look, a large flow of saliva and froth, and unconscious delirium, are the usual symptoms. The time of their appearance varies from the third week to even the fourth month after the bite. After sheep have been decidedly worried by a suspicious dog, they should be shorn, and the skin most carefully scrutinised for the marks of the bite, for the very smallest wound will be sufficient to cause infection. At the same time it must be admitted that there is less danger in wounds through the fleece, because the teeth of the dog will probably be cleaned of their poisonous liquid, by passing through a thick wool. The farmer must take his chance of this, if he

* Much of the injury arising from the dog's biting the sheep might be prevented by proper training, and more careful management. The treatment recommended by the author, in case they are bitten, appears to me to be very judicious.—W. HUMFREY.

Having been much in Spain and Portugal, I have there observed that the sheep-dogs, which are of a powerful and savage nature, are solely employed to guard the flocks from wolves, and are never allowed to bite the sheep when collecting them together. This is, of course, the effect of instruction, and there can be no reason why it should not be adopted with equal benefit in this country. The Spanish shepherd, indeed, teaches some of the rams to come to him by name; and when the flock is required to move, he calls one of them forward to follow him. The flock naturally, also, follows the ram, and the shepherd, marching a-head, *leads* instead of *driving*.—F. BURKE.

I should recommend the flock-master not to keep a *savage* sheep-dog.—RICHMOND.

thinks the shearing too hazardous or too unseasonable an experiment.

I will now mention two cases of severe loss occasioned by the bite of mad dogs, one of which I copy from the 'Bristol Mirror:' the other occurred some years since to a person with whom I was acquainted. I notice them to impress more forcibly on my readers the necessity of my previous cautions:—

"On the 22nd March, 1838, early in the morning, Mr. John Reeve, of Rudway Farm, in the parish of Stapleton, had twenty-three of his sheep and lambs worried and bitten in a frightful manner by a dog belonging to a poor neighbour, who concealed her apprehensions of the rabid state of the animal till the event proved the certainty. Being caught in the fact of biting the sheep, the dog was shot at, but, receiving only a portion of the charge, was still able to run home, where it was pursued and eventually destroyed. So severely were six of the lambs bitten, that they either died or were obliged to be killed the same day. No apprehensions being entertained by the farmer that the dog was mad, the wounds of the sheep were merely dressed. On Saturday (21st April), however, symptoms of hydrophobia manifested themselves in the poor creatures, and one of the lambs died; on Sunday a second died, and on Monday a third lamb died, all mad. On Tuesday three ewes were obliged to be destroyed; on Wednesday two ewes and four lambs were killed; on Thursday two ewes and two lambs died, all mad; and it is feared several others must be destroyed. We understand also that, about two months ago, Mr. Jones, of Stapleton, met with a similar misfortune, and had upwards of a score of sheep and lambs bit in the same manner, and that several of them also died mad."

The other instance happened to a respectable farmer of the name of Hodge, residing within three miles of Exeter, who lost a considerable number of valuable ewes from the bite of a rabid dog. It was several weeks from the first attack until the disorder stopped. He killed the animal in the act of worrying the sheep, but took no precaution to prevent the malady.

The Eye of the sheep is liable to many diseases, but for the most part they are symptomatic of other complaints affecting the constitution, and will disappear when the constitutional disorder is removed. Amaurosis, or paralysis of the optic nerve, is often the result of apoplexy, or of water in the head. The scab, when it reaches the head, will leave considerable soreness in the eyelids, and some other diseases will leave their traces on this organ; in all such cases relief may be given by a zinc lotion (Appendix, No. 8), but a cure can only be expected in a removal of the original disease. The complaint called Blindness, to which sheep are much subject in some of the western counties, is an

inflammatory affection of the eyes, causing, as its name denotes, a partial or total loss of sight. It sometimes appears an epidemic disorder, as most of the flocks in the neighbourhood are attacked with it about the same time. Nature generally effects a cure in a few days. I have found it necessary, when the complaint is more obstinate, to bleed from the vein formed in the angle of the eye, and bathe the eye with the zinc lotion, as recommended for the preceding complaints; but nothing can be more injurious than the application of any irritating substance to this tender organ, such as glass, or even powdered sugar. Wherever inflammation is found, all such applications have a direct tendency to increase it; for, although the eye itself is not possessed of much sensibility, the lids are particularly susceptible of the least approach of any particle of dirt or other substances, nature having endowed them with this peculiar sensitiveness to make them rapidly shut, for the better protection of the sight.

Another disease, allied to the scab in its outward appearance, but not springing from the same cause, nor yet contagious, has been called Black-muzzle. It is an erysipelatic eruption on the nose, sometimes extending up the face. In lambs it has been attributed to a cutaneous affection of the udder or teats of the dam, whether justly or not I have never had an opportunity of observing; but, as it is always confined to the face and generally spreads from the nose, it is probable that it proceeds from some cause connected with the feeding; it is not peculiar to lambs, nor is it of common occurrence at any age. The mild mercurial ointment given in the Appendix (No. 1) will cure this complaint with very little trouble.

A complaint known in the midland counties by the term black-leg, which I never met with, has been described to me as an enlargement of the legs occasioned by the deposit of a fluid, of the consistency of jelly, immediately under the skin. It is probable that this is a dropsical effusion of serous fluid, and merely symptomatic of general debility; I cannot, however, pretend to give any satisfactory explanation of either the cause or the nature of this complaint. It would be best treated by mild purgatives and tonics.

Sheep are sometimes liable to a disorder in the mouth, occasionally extending to the fauces, that has been called the Thrush. It has been supposed by some persons to be intimately connected with the foot-rot, the thrush often appearing at the same time that the foot is affected. This is plausible, for the sheep being in the habit of licking its foot when sore, may suck in some of the acrid discharge, and thereby occasion those vesicles in the mouth that constitute the complaint; the symptoms of which are refusing food and general lassitude, arising perhaps from inability to feed.

Alum, dissolved in water, applied as a lotion to the mouth, will speedily remove the tenderness that prevents feeding; and, if promptly resorted to as soon as there is reason to fear the existence of the disease, will effect a cure before the condition is much reduced

The HOVE, or HOVEN, or BLOWN, is a distension of the paunch by gas. The gas is generated by fermentation of the food, especially cole-seed, turnips, or clover, if largely eaten before the sheep has become accustomed to the diet. It resembles the distension of the stomach by too much food; but there are evident distinguishing differences which it is important to notice, because the remedies in the two cases are very different. Where the paunch is overloaded with food the animal is much distressed, though the swelling is less marked; and when the flanks are handled, there is less elasticity perceived: but where the distension proceeds from gas, the elasticity is very great, the whole abdomen is enlarged, and the skin has the tightness and almost the reverberation of a drum when struck by the hand. The breathing is laborious from the action of the diaphragm, which separates the lungs from the stomach, being impeded. The remedy, in the case of the loaded stomach, is obviously to relieve it of part of the contents by exciting vomiting, if it can be effected: this, I have understood, is sometimes successfully done by the infusion of warm water by means of a stomach-pump in large quantities. If relief cannot be obtained in this way, the paunch should be opened at the flank, and a considerable portion of the superfluous food removed. The wound made for this purpose must be stitched together, and a pitch-plaster applied as an external covering. And here I would wish to remark that one of the principal causes of this complaint is occasioned by turning sheep upon the stubble immediately after harvest. The corn which they pick up, particularly wheat, by its swelling distends the stomach and prevents it from performing its proper functions, even when assisted by medicine. No other resource is therefore left but that just described. To prevent this complaint the shepherd must be careful not to turn his flock into the stubbles until the grain has sprouted, when all danger ceases.*

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* As a preventive for sheep becoming blown, it is an excellent plan to sow common salt over the fold which contains their food, early in the morning while the dew is on it. In the year 1836, I experienced its good effects while feeding off a piece of rape, having lost several lambs by their being blown. I bought a sack of salt and had it sown over the fold every morning before the dew was off: and the consequence was that I only lost one sheep afterwards, and this occurred by accident, the shepherd, through neglect, allowing it to run into the rape which had not been salted. There are two advantages to be derived from this simple remedy: it not only

The treatment of hove, or distension from gas, is very different. In the first place, it must be remarked, that though hove, in its aggravated form, suddenly follows an excess of fermenting food, it is often a dyspeptic symptom connected with other disorders: attention should therefore first be given to the general state of the sheep, and especially to the abruptness of the attack. If the animal has previously shown a reluctance to feed, or general dulness without any perceptible cause, or a disordered state of the stomach, it may be safely assumed that the hove only indicates the seat of some other disorder, which must first be removed, and then the distension will subside. But if this distension is very rapid and decided in its appearance, and if it follows immediately upon the change from poor pasture to rich clover, the fair inference is that gas has been extricated without any previous derangement of the stomach from other causes; and it must be promptly discharged by puncturing the paunch. This may safely be done with a proper instrument. It is usually effected by a knife; but to this there are serious objections—a larger incision is made than is necessary, and when, by the expulsion of the gas, the paunch is reduced in size,—the wound through its coats no longer corresponding with the external orifice in the skin,—portions of the food are discharged with the gas into the abdomen, and remain lodged there, a permanent source of mischief. If, on the other hand, the puncture is effected by an instrument called by surgeons a trocar, and used by them in tapping for the dropsy, the gas is entirely discharged through the external wound. The trocar consists of a sort of dagger, which is sheathed, except at the point, in a metal tube; the puncture is made by the dagger when thus sheathed. The trocar is then withdrawn, but the sheath remains; and through its tube a regular communication is preserved with the external orifice, notwithstanding the reducing of the stomach when the extrication of gas begins to subside. Another mechanical process, often adopted with success, and in some respects more eligible than the trocar, is the introduction of a tube into the stomach through the gullet. The tube used for this purpose is made by twisting iron wire, of a very fine diameter, close round a smooth iron rod, about a quarter of an inch thick, that may be withdrawn at pleasure. After the frame of the tube is thus made of sufficient length, it should be covered with smooth leather, so as to make it air-tight, and prevent wounding the gullet in passing it. The gas will discharge itself through this tube, and the animal be instantly relieved. But it sometimes

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directly benefits the general health of the sheep, but all that falls on the ground acts as manure, so that nothing is wasted.—W. Humfrey.

The salt might also be placed in troughs in the field.—The Author.

occurs that the ease thus obtained is only temporary, and the manufacture of gas may continue undiminished; it is then obvious that some method must be resorted to to prevent its accumulating. An injection of chloride of lime, to the extent of a drachm in half a pint of water, administered through the tube before it is withdrawn, will, by chemical affinity with the hydrogen, have the desired effect. After the sheep is relieved, 2 ounces of Epsom salts should be given.

In the earlier stages of hove, I have found relief derived from keeping the sheep in constant brisk motion; this is supposed to cause a relaxation of the pillars of the roof of the paunch, which allows the gas to escape into the œsophagean canal and through the gullet: it may however be doubted whether this remedy is beneficial for any other reason than that it interrupts the feeding, and prevents in consequence an accumulation of gas more rapidly than the animal can bear. I have also experienced good effects from giving 2 or 3 ounces of castor oil combined with 2 drachms of ginger. There can be no harm in trying these milder remedies before resorting to mechanical means; but if the distension rapidly increases, no reliance can be placed on any treatment without operating. Sheep should not be first turned upon clover or other luxuriant pasture when in a hungry state.* This simple precaution will generally prevent the access of the disease.

Diarrhœa and Dysentery.—The distinction between these too frequent and dangerous diseases of the sheep is, that the first is mostly confined to the mucous membrane of the small intestines; in the other, the large intestines are involved, and the inflammation is more intense. Diarrhœa is peculiarly fatal in lambs, especially when first weaned. Some care is requisite to distinguish between a healthy, though perhaps too abundant, discharge, and one that is the effect of disease. When it attains so much violence as to interfere with the animal's strength, and to take him off his feed, it must be regarded as disease, and be instantly checked. The milk of the ewe is naturally aperient; but, in general, diarrhœa is attributable to the quality of the food when the lamb begins to graze. Young succulent grasses are very apt to produce it; and it follows that change of diet is the proper remedy. Dysentery is often attended with inflammation of the bowels, and sometimes with febrile symptoms. Where the animal labours under obvious pain in the abdomen (and the seat of the pain will be easily discovered by its shrinking from the touch), I recommend

* Nor until the dew be off. If a little old hay be also given before they are turned out of the fold, it will in a great degree check the danger during the first few days after they are put upon turnips.—F. Burke.

bleeding. Aperient medicine—and castor-oil is the best in this case—should also be given, but aperients will be mischievous unless the inflammatory character is well defined. In other cases I have given the astringent drink which is described in the Appendix (No. 7). It is often the case that sheep are scoured by the young grasses in the spring of the year. This is not necessarily injurious to them, perhaps the reverse; but in such cases it should be the business of the shepherd, especially in the long-woolled breeds, to shear away the wool on the tail and down the breech. This should be done towards the end of April. Keeping the sheep clean in this way tends to prevent the attack of the fly. I have heard of injections being used in cases of dysentery. I believe them more likely to produce mischief than good: the disease generally, especially in its aggravated form, occasions a secretion of mucus, to an unnatural extent, in a part of the bowels which no injection would reach.* I have much more faith in the astringent drink that I have recommended; and should it not prove efficient, the laudanum may be cautiously increased, but great caution must be observed in the case of lambs.

The Rot is of all the diseases of sheep the most fatal, and perhaps, as respects its proximate cause, the least understood. The disease itself has been well ascertained to be an affection of the liver. Its early symptoms resemble those of a diseased liver in man: the skin, on separating the wool, will be found to have a yellow tinge; the membrane lining the interior of the eyelids, and the gland in the corner of the eye, called the *caruncula lachrymalis,* will have the same hue; and even the flesh, if the sheep is killed in this stage of the disorder, will lose its proper colour, and be pale. Extreme emaciation, attended with dysentery, loss of appetite, and enlargement of the abdomen will be the next symptoms, and generally attended by some degree of cough; cracking of the loins on pressure is distinctly perceived; dropsy follows, and, in the course of seven or eight weeks, or even sooner, death ensues.

Eager and rapid feeding, and occasionally sudden death among the flock, have also been mentioned by a learned writer (Dr. Harrison) among circumstances that should rouse the shepherd's suspicion.

On examination after death the appearance of the lungs is very uncertain, but the liver is invariably found to be the principal seat of the disorder, though all the abdominal viscera are more

* Injections, composed of warm gruel, with the addition of twenty, thirty, or forty drops of laudanum, would do good, by allaying the pain and great excitement consequent upon this disease, although probably they might not reach the actual seat of it.—T. Spurgin. [Communicated by Lord Braybrooke.]

or less diseased. The liver is generally rotten and completely destroyed. It is found to be filled with a sort of worm, called flukes; and these animals sometimes extend to other parts of the intestines.

These flukes are by some considered the cause of the disease, and it has hence often been called "the fluke." This is clearly an error. The fluke is by some supposed to be generated by the corrupt state of the liver, and rot is often unequivocally developed in animals that have been killed in its early stages without any appearance of flukes. I have also observed that where rot is speedily fatal no flukes have been discovered, though flukes have never been found unaccompanied by other symptoms of decided rot. Such, in few words, are the general incidents of the disorder. But though the symptoms are well known, and the seat of the complaint ascertained with precision, the cause of it remains a matter of much dispute. It differs greatly from hepatic affection in the human subject in the rapidity of its attack. The approach of liver complaint in man is usually gradual, it often being the result of intemperate habits early formed and long indulged; but in sheep the derangement of the organ appears to be affected by indulgence almost momentary. I recollect a case that occurred in Devonshire, where an action was brought by a farmer on the warranty of some sheep that died of the rot very speedily after his purchase. It was proved, however, that though the whole lot died but one, that one which had remained untainted, had wounded its leg on its journey home, and was carried by the farmer in his cart, while the rest were allowed to graze on a common over which they were passing. This was urged and received as conclusive evidence that the sheep were sound at the time of purchase, and became diseased from the accidental pasturage. Other cases very similar have often occurred and been reported in various agricultural works on undoubted testimony. One case, indeed, exactly parallel to that which I have mentioned above, except that it had not the confirmation of evidence in a court of law, has often been quoted. It was first given by Dr. Harrison, on the authority of Mr. Wright, that a tired sheep, taken into the drover's cart while the rest of the drove were feeding on the road-side, and afterwards turned into the same pasture, escaped the rot, while all the others were affected. A relative of mine, Mr. Batten, once exchanged a ram with a neighbouring farmer in Devon, residing about 10 miles from him. The ram he parted with in a few days became diseased in common with all the flock that he served, while that which was received in exchange, and brought back in the same cart, lived many years wholly untainted.

So many are the proofs, that rot is produced by peculiarity of soil, that it is not worth while to quote evidence to this effect; but

the question still remains in what this fatal peculiarity of soil consists. This question is rendered more difficult of solution by the capricious exemption of particular districts from this pestilential disorder. In some of the marshy pastures of Kent, such as the Isle of Sheppey, where the ague is prevalent, the rot is but little known, and generally throughout that county is rarely met with. The same fact may be stated of Romney Marsh and of the Essex marshes, an exemption which may possibly be, in some measure, explained by their proximity to the sea. The South Downs of Sussex are also said never to have been visited by the complaint. But this exemption is not peculiar to large districts; on the same farm some pasturage will rot sheep, while other meadows will produce no mischief. Even in ground that is underdrained, and presumably dry, sheep will be affected, some part of the soil being perhaps light and porous, and hence easily drained, while other parts that are heavy and clayey, though the drains are no farther apart, retain lodgements of wet, from which a pestilential exhalation proceeds. Observation, however, has led to the conclusion that whatever may be the poisonous matter, whether animal or vegetable, the existence of it is immediately consequent on moist or wet weather, especially if followed by warm suns, while dry weather returning prevents the disorder spreading. It has also been noticed that wet pasturage, as such, does not generate the disorder; that sheep have been fed in meadows adjoining to rivers, and in fields with ponds in them, without infection, though constantly exposed to wet; but that, when the process of exhalation begins, these very pastures, though previously innocuous, become capable of exciting the rot.*

It has been stated, on good authority, that the fatality of the climate of Sierra Leone, and perhaps of many other tropical countries, begins at that period of the year when vegetation, having

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* My own opinion differs from that of the Author, respecting the cause of rot in sheep, although I am happy to say that we know little of the disease in this part of the kingdom. But I have twice had the rot make its appearance with me, and both times it has occurred when the sheep have been *made* in a field the *whole* of which was wet; for although my sheep have always been allowed to go into the same field, the disease has never attacked them but twice, the first time being the accidental consequence of their being *confined* in this particular field, when fatting, and the whole of them proving to be affected with rot; and the second, when I tried in the following season the experiment of inclosing a few more in the same place, the result of which was the occurrence of the disease in the greater part, but not the whole of them. From these facts, and much consideration of the subject, I have formed the opinion that sheep get the rot in the greater number of cases from the circumstance of being *compelled to lie on wet ground;* for when they have been at liberty to range into other fields adjoining the marshy one referred to, and could thus obtain dry resting-places, although fed chiefly on the wet land, I have never found a single sheep deficient.—W. Greaves.

become luxuriant and rank by excessive rain and extreme solar heat combined, rots away suddenly and exhales a miasma. The form in which disease at this period attacks the human frame is commonly called dysentery and hepatic affection. I have understood, from some who have long resided at Freetown, that the stench of putrid vegetable matter, accumulated even in the streets during the rainy season and immediately after its termination, is offensive to the highest degree. May we not infer that the taint of rot proceeds from the same cause? for though the miasma, in the pasturage I have alluded to, may not be produced in sufficient quantity to affect the human subject, standing upright at a distance from the effluvia, it may be sufficient to affect the animal that in feeding has his nose in constant and close contiguity to the soil. If we are justified in this reasoning, the inferences to which it leads are most important. I do not mean to claim the merit of originality in this view of the subject. It has long been a prevailing opinion that the rot originates in marshy exhalations, but it is desirable to arrive at some conclusion which is at least founded on plausibility, in considering the variety of causes to which rot has been ascribed; and of all the many speculations to which the ingenuity of theorists, or the more homely ideas of practical men have given rise, I think that the theory on which I have dwelt is most consistent with the experience of the farmer. I will, however, admit that there are many sensible men who consider that the disorder is propagated from the qualities of their food, and not from exhalation, as it has been remarked that close feeding is almost essential to the contagion. In the parish of Seaton, in Devonshire, all the sheep that were depastured on the marshes one year were attacked with rot, and died, only excepting four; on examining these four, it was found that they were hog-jawed, and, from the under jaw being very much shorter than the upper, they could not bite near the ground.*

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* It appears in this part of the Essay that many different opinions have arisen respecting the cause of rot in sheep; I therefore beg to state my opinion and experience on the subject in as short and explanatory a way as possible. I would beg to say that I do not think sheep become rotted from *every* kind of wet land whether drained or not, but from a particular character of soil and subsoil: soil of this description is inclined to bog or quagmire, although it may not have that appearance on the surface of the land, but may lie 8 or even 12 feet deep. Between this subterraneous bog and the surface there is generally a hard stratum of blue clay or sand, tainted with the bog-water, lying underneath at that depth; and this infectious water is brought up from the bog to the surface of the earth by means of small pipes which are always found to form the communication between them, and called by experienced land-drainers *bog-pipes*. In consequence of this infectious water thus arising to the surface, a plant is produced—not of the grass-tribe, but called by some old experienced shepherds the

It has often been remarked that, slow as has been the progress of veterinary science generally, there is no branch of it which seems to have made such little advance as the treatment of the diseases of sheep. There is perhaps no disorder of sheep which illustrates this more decidedly than rot: without pretending to discuss this point of pathology, I am however led by many considerations to the conclusion that it may prove a curable disease.

I lately received from a very intelligent farmer at Sanderton, in Bucks, a communication of a fact that confirms my views as to the possibility of cure. Eight years ago he purchased eight score of sheep. After feeding the flock for a few days on turnips, he found that they were all affected with the rot, and 130 died. The greater part of them were examined, and the liver in every case was found to be diseased. The other thirty, having been taken off the turnips and fed on hay, recovered, and at the end

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sheep-rot-weed; and if sheep are allowed to feed on this land, particularly if in a hungry state, although the weed does not grow more than an inch or two above the surface, and is of a nauseous taste, they will, in this state of hunger, indiscriminately eat it up along with the grass, and it will I believe more or less infect them with the rot. When a hole is made in land of this description so as to allow water to collect and stand in it, the surface of the water will in 24 hours become covered with a scum, having the metallic lustre of quicksilver tinged with red, and therefore probably of an injurious nature. There is no doubt that dry land is by far the best for the health and well-being of the sheep, but I know from experience that they are not rotted by feeding on such land as is merely made wet by rain-water, nor by pasturing in irrigated meadows, unless such meadows are irrigated by bog-water.

Having paid great attention for many years to these points, it is my humble opinion that one great cause of sheep's being rotted may be traced to the circumstance of their eating the noxious weed and scum in question, arising from soil contaminated by impure water.

I would beg to observe that a drain laid only to the depth of 2 or 3 feet (the common depth of draining) will not prove effectual, as the bog-pipes arise in a perpendicular direction, and if the drain be not laid to the depth of those pipes, no good effect can be expected, nor can it be said that such land is effectually drained, so that sheep may feed on it with safety.—Note by Mr. Edward May, of East-Hampstead Park, near Bracknell, Berkshire.

The preceding remarks were transmitted at my request, by an individual in whose matured experience on all subjects connected with drainage I can individually place the greatest reliance; and Mr. Dean, a member of our committee, having placed in my hands a small work written in 1651, by Hartlib, the friend of Milton, I have found it to contain not only observations which coincide with those of Mr. May, but further interesting notices of the *sheep-rot-weed* in question; the author of the tract however attributing not only to the noxious plant, but also to the circumstances of the soil and locality, the origin of the rot in sheep in such situations.—Downshire.

The bad effects of a *sheep-rot weed*, or of *bog-water*, are, in my own opinion, very doubtful. The rot in sheep is probably the produce of ground which has been lately wet, and then the surface exposed to the action of the air. The grass and other plants, previously weakened or destroyed by the moisture, become decomposed, or rotten; and, in that decomposition, certain gases, or miasmata, may be developed, that cannot long be breathed, or scarcely breathed at all by the sheep without producing the rot.—W. Youatt.

of two years twenty-nine of them were sent to the butcher, in good condition. He requested that they might be examined when killed, and it appeared that the liver was affected in every case in the usual way. He still possesses the single sheep that was not sold, and she generally produces twins every year, though she has long shown the symptom of rot called *choquered,* or *bottling*—a large glandular swelling under the neck. He has usually lost sheep by the rot every year, and ascribes it to turnip-feeding, or feeding on undrained land, having found it arise from both causes.* He has often found the disorder relieved by change of diet alone; and that his sheep improve in condition shortly after being tainted. As evidence of the effect of turnips in causing the disorder, (probably when covered with a heavy dew or hoar-frost,) he once had five sheep exhibiting symptoms of the complaint, and, removing them from turnips to dry food, they all recovered. In the course of seven weeks he fell ill, and, being confined to his bed, his shepherd again turned these five sheep on the turnips. All of them relapsed, and speedily died, and on examination their livers showed all the usual symptoms of the disease.†

It is also my conviction that the same sanatory process as is used with human patients might, if practised in time, be successfully adopted with sheep. I have already stated that the rot is far more rapid in its attack, and apparently more capricious in its exciting cause than any analogous disorder in man; but I do not, therefore, subscribe to the common opinion that it is an inflammation of the liver. All inflammatory action is attended with pain, and if the inflammation is acute, the pain is severe; but this unequivocal symptom appears to be wanting in the rot. Animals show far more decidedly than human beings the sensitiveness of pain. Pain often produces heaviness, depression of spirits, and what is called anxiety or uneasiness in the expression of the human features; but in the brute creation the effects are different, extreme restlessness, and where the pain is acute, extreme distress and violent motion or struggling being the indications. Now, in sheep affected by the rot, the first symptoms that I have mentioned are always found, the last are wanting; hence I infer that inflammation, at least to any extent, does not exist in the first access of the disorder, and therefore, that bleeding, the usual and most efficacious remedy in inflammatory complaints, would be

* If sheep have been pastured in low wet land, and have taken the disease while feeding there on turnips, they will incur the complaint, and the animals will be speedily carried off; but no sheep, in my own opinion, were ever rotted by merely feeding on turnips.—J. W. Childers.

† I have not either myself experienced or heard, or read before of the fact of turnips rotting sheep, but I think they are not proper food for sheep when they are already rotted. I think it highly probable that these sheep at Sanderton were rotted *before* the farmer in question had them.—W. Humfrey.

misapplied. The first step that ought to be taken is to remove the sheep if possible to high and dry pasture, and perhaps to more scanty feed, so as to diminish the necessary action of the liver.

I once purchased 12 wethers apparently far advanced in the disease; they were the only survivors of a lot of 70. I bought them on mere speculation at 5*s.* each. I placed them in the stack-yard, and allowed them nothing but beans and hay, with a supply of water, and rock-salt to lick. Three died in the first week, the others recovered.

As a matter of general precaution, the drainage, if possible, of all land liable to rot sheep, will be highly expedient, especially if we may rely on the fact which has been stated by experienced writers on this subject, that May and June are the months in which the contagion is generally found to exist,* and then exactly in proportion to the prevalence of heat after showery weather: but precaution, though better than cure, is not cure. Aperient medicine, and in strong and repeated doses, for a few days, cannot be mischievous. There is no maxim in the medical art so well understood, or so generally admitted, as that the first step towards the restoration of the healthy functions of any organ is to secure a good and regular action of the bowels. Castor oil, or Epsom salts, are the surest and safest of all aperients. It is obvious that discipline of this kind will immediately reduce condition, but I presuppose that the flock is no longer generally in a saleable state, and that the only alternative is a cure or an absolute loss. Having thus secured a proper action of the bowels, I should have free recourse to calomel. I do not think that 4 grains would be too much for a daily dose; and, even at the risk of salivation, I would rather err on the side of excess in the case of rot. It may be borne in mind that, in all cases where drugs are specifics in a disorder, the disorder itself neutralises in a great degree the natural operation of the medicine: thus, in dysentery, laudanum may be exhibited to an extent that would prove fatal to a healthy subject; and, in like manner, a dose of calomel, that would materially affect the salivary glands when there is no counteracting principle, would be innoxious, and even beneficial, when its active properties are brought into direct play on a diseased liver. Some persons have advised the combination of calomel with opium, but I am inclined to doubt whether this may not weaken its action on the system, and produce harm by the astringent qualities of the opium operating on the bowels.

A few doses of salts should be repeated after the calomel has been given, and as soon as the sheep appears convalescent; but not previously, unless signs of salivation show themselves. The

* I should consider the months of September and October as those when contagion is much more prevalent.—J. W. Childers.

patient should be fed on hay or clover-chaff, sprinkled with common salt; and, for some weeks after recovery, the character of its food should be attentively regulated, avoiding all succulent vegetables as much as possible until health is completely restored.

It may not be improper to mention other remedies that have been quoted as beneficial. In the Agricultural Report of the county of Stafford, a table-spoonful of spirits of turpentine mixed with two of water, twice administered, after an interval of 3 days, is said to have cured 5 out of 6 rotten sheep. Salt, to the extent of a table-spoonful, has also been given with useful effect; and it is a matter of acknowledged experience, that the sheep fed on salt marshes are not liable to the complaint. I am also bound to admit that the use of mercury has been deprecated by some writers, who assert that, in herbivorous animals, mercury has not the same specific action that it has in the human subject. It is well known, however, that in horses calomel is often administered with decided benefit in hepatic affections; but I think it right to mention the variety of opinion that exists on such an important topic. I have known the recipe, which I quote in the Appendix (No. 6), administered with very salutary effects.

I may here notice another precautionary measure, which is I believe rarely taken,—to avoid turning the sheep out of the fold while the dew is on the ground. Dewy vapours are well known to be injurious to the animal in feeding.*

Dropsy, or Water-sickness, is a disease very generally known to shepherds. It seems to proceed from constitutional debility rather than from any accidental cause, though it is most frequently met with where the pastures are bleak. Aged sheep are most liable to it. Its symptoms are all of the dropsical kind. Swellings appear and change their seat without apparent cause; the sheep becomes dull and languid, and, ultimately, the belly is distended with water, and the motion of it can be perceptibly felt against the hand. I can recommend no other treatment than a substitution of hay, of the best quality, cut into chaff, for all moist food; and to this may be added oatmeal-gruel: the sheep being carefully housed, and the bowels kept open. A decoction of oak-bark has been favourably spoken of; but though, in all dropsical affections tonics seem to be the natural remedy, I cannot from my own experience testify to their success in this case. Tapping will produce no permanent effect; the water will rapidly accumulate again, unless the seat of the disorder is attended to.

Redwater, or Resp, is sometimes confounded with bloody

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* I prefer my lambs to have their food early during the summer months; the Hampshire farmers turn their lambs out as early as three, four, and five o'clock in the morning; and they make a higher price of their store lambs early in the season than the farmers of any other county in England. —W. Humfrey.

urine: it is a different complaint. The urine may be tinged with blood from inflammation of the kidneys or bladder; and in such cases the inflammatory symptoms must be subdued, as in all other instances of acute inward inflammation, by bleeding copiously and exhibiting purgatives: but redwater is an inflammation of the abdomen, or of the membrane that lines the abdominal cavity, and the redwater is found in that cavity.

Some persons treat this complaint as inflammation of the kidney. It is extremely probable that, in all cases of redwater, the inflammation of the abdomen may extend to the region of the kidney, and thus some of the indications that appear may lead the observer to suppose that the kidney is the primary part affected: but my opinion, founded on post-mortem examination of the subject, is, that the inflammatory action has its origin in the peritoneum, and, consequently, that change of diet and attention to the bowels are the first points to which the care of the shepherd should be directed. If this opinion is well founded, diuretic medicines are not judicious.

Feeding on turnips when covered with hoar-frost is supposed to occasion the complaint. Another, yet more probable, cause may be folding sheep on wet soil during frosty nights. The progress of this disease, as indeed is the case with all acute inflammation, is very rapid; so rapid as to occasion death in most instances before the existence of it is suspected. Where its progress allows of observation, the indications of it are costiveness of the bowels and great pain and distress; the animal appearing incapable either of rest or active motion from the violence of its sufferings. Its name is derived from an accumulation of bloody fluid in the abdomen. The remedy is, as I have already mentioned, copious bleeding, even until fainting takes place, and this followed by opening medicine: but it is so rarely the case that a cure can be expected, that, if the sure symptoms of it are perceived, the best way is to kill the sheep before they have obtained their height. Where I have succeeded in removing the inflammatory symptoms, I have immediately changed the food, and put the sheep on bran and oats, very liberally sprinkled with salt. I also provide water very copiously.*

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* This disease is very prevalent in this part of Derbyshire, and a friend of mine, Mr. Cooper of Ashford, for many years lost one-fifth of his hoggets from redwater. Three or four years ago he was advised to bring them into a yard, and give each hogget a table-spoonful of common tar every fortnight, and the consequence has been, that, although they are kept in every respect in the same way as before, and on the same ground, he has not lost one sheep since the adoption of this treatment.—It will be thought tar is my common recipe for all diseases, when I state, that two table-spoonfuls given every fortnight to year-old calves has been found a great specific against

Redwater has sometimes been called "WATERY BRAXY," but I apprehend that the braxy is more properly a retention of urine, proceeding from inflammation of the bladder, as the dry braxy is another name often applied to inflammation of the bowels. I never met with a case where a ewe laboured under retention of urine. When it occurs it most frequently attacks rams, and many valuable sheep have been lost from its effects. I have remarked it to have been generated by placing them on clover that had previously been mown. As it may be easily detected by the distension and tenderness of that part of the body externally, the water can be successfully drawn off by a catheter. It may not be unnecessary to caution the shepherd that diuretic medicines are most injurious in a retention of urine, as they increase the secretion of the fluid without in any way facilitating the discharge.

BLACKWATER is another complaint occasionally observed in sheep, and is indicated by the discharge of a black and sometimes bloody serum from the kidneys. After death, a fluid of the same description is found in the stomach. Rank pasturage is believed to be the cause, and, of course, change of pasturage most likely to prove a cure. The bowels should be kept open, and tonics, such as bark or steel, exhibited. A tea-spoonful of vitriolic acid in an infusion of oak-bark is a convenient compound.

Sheep are not very susceptible of vegetable POISON; but the foliage of the yew-tree is fatal to them, and perhaps some other plants with which I am not acquainted. Generally speaking, sheep will refuse food of a deleterious character, but lambs are more careless, or their instinct is less powerful. Where there is reason to apprehend the presence of poison, the injection of warm water by the stomach-pump, until vomiting is produced, appears the only efficient or practicable remedy.

I must not dismiss this part of my subject without adding a word or two on INFLAMMATION generally. In most of the disorders that I have enumerated, inflammation is one of their symptoms; but an inflammatory affection often appears, though without a local determination of it to any organ or part so as to enable us to fix the seat of the disease. In such cases it is usually known as fever, and is indicated by general heat, throbbing, and loss of appetite. It is difficult to lay down rules for its treatment when thus extended through the system, but the safest principle is to bleed copiously from the neck, give aperient medicine to such an extent as to keep the bowels well open, and drench the sheep with cooling drinks, and

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the Murrain (or, as we call it, the Speed). Mr. Cooper rears a few every year, and three years ago lost three-fourths of them, but he has not lost any since he used the tar.—W. GREAVES.

warm mashes or thin gruel. In every case where much pain is evinced on touching the belly, the flanks, or any other particular place, fomentations may be beneficially applied; but all fomenting must be patiently persevered in for an hour together, or even more, if it is designed to be effective. Inflammation is an unnaturally increased circulation of the blood and a consequent distension of the vessels. Where the part affected can be distinguished, and lies externally or superficially, fomentation produces local relief by removing that tenseness of the integuments which excessive circulation produces; but, in other cases, the excess of blood must be removed by depletion, and its renewed accumulation be prevented, if possible, by aperients and low living. Being in the latter case usually accompanied by extreme thirst, drenches and gruel remove this unpleasant sensation, while they afford nourishment without enriching the blood.*

Cough, or Cold, will sometimes affect sheep severely. Its symptoms resemble those in man, and are removed by very similar treatment; but in an aggravated form it must be decidedly controlled, or it will terminate in consumption. If inflammation shows itself decidedly about the throat and larynx, attended by a violent discharge from the nose, it will be prudent to bleed the sheep freely from the neck, and, by the aid of warm mashes and removal to a sheltered spot, the symptoms will

* I have one general fault to find with the Author's treatment, namely, in the case of bleeding. In my own experience, I have suffered much from bleeding horses and cattle; and sheep would, I have no doubt, be injured in the same degree. There is often so much apparent inflammation from debility, when bleeding would be fatal, that I think he too indiscriminately recommends the depletion of the system, and I perceive advises it under most of his heads. In epidemics generally, unless active inflammation exists, I never bleed; and I may mention, in illustration of the principle of my practice, the following striking instance in reference to this point. Three years ago, when there was a disorder among coach-horses, I had forty ill in ten days. One of them was bled, namely, the first that was taken, and the only one that died; for, although by the bleeding the disorder appeared to be removed, so general a weakness ensued in the case of this horse, that dropsy was the result. Having paid much serious attention to the nature of the complaint, and feeling confident in my own mind that much of the apparent inflammation arose from general debility of the whole system—an opinion in which I am confirmed by knowing several people whose horses had been attacked before my own, and their stock sacrificed to a considerable amount by injudicious bleeding—I took the other way, and gave each of the horses, as they became severally affected, a quart of good ale, with ginger and other spices, and two quarts of oatmeal gruel: the consequence was, that there was not a single horse that did not recover under this mode of treatment; and, I may add, that although I generally keep about a hundred horses, I have not allowed one of them to be bled for the last two years, and since the discontinuance of bleeding I have not had half the number of cases of swelled legs and grease I previously had. —W. Greaves.

shortly disappear. Epsom salts, to the extent of two ounces, may be usefully given; and, when the sheep recovers, it should be housed during the continuance of severe weather. The first week of spring will cure every patient without further trouble.

CONSUMPTION is a more common disorder among sheep than is generally supposed: the animal being usually killed as soon as a wasting of the condition becomes apparent, consumption has scarcely time to assume its peculiar and decided character. The lungs of the sheep, however, are rarely found quite free from disease. This may be ascribed to various causes. While the cough is only in an incipient stage the animal does not lose condition or appetite, and consequently the animal is disregarded until disease has made considerable progress. His exposure to wet and cold continues; he is shorn with the rest of the flock, without regard to weather or to his peculiar infirmity of cough; and thus the symptoms are daily aggravated, when, by a little prudential management in the beginning, he might possibly have been cured. At length, if his gradual decline renders it expedient to destroy him, he is killed before the real nature of the complaint is discovered. Attention should be given to every case of cough as soon as it shows itself; and the best precaution is at once to remove the sheep to a sheltered situation.

The FOOT-ROT is a complaint which I am well assured has by the generality of writers on the subject been treated of much more from theoretical knowledge than practical experience; for, although the symptoms and remedies appear plausible and read well, yet a short trial of the latter will soon prove their absurdity. It is a disease with which I am intimately acquainted, having for six years superintended a flock in a county where it was very prevalent, and I have cured thousands. The disease generally commences with a soreness between the claws attended with slight inflammation, which quickly insinuates itself beneath the horny part of the hoof. The crust becomes gradually detached as the ulcerous sores extend, and, finally, the hoof itself is lost.

It is most prevalent in the fall of the year, and, as this form of the complaint is found to affect many of a flock at the same time, it is generally considered to be highly contagious: but there is no sufficient evidence of this, and my experience is opposed to the doctrine.* For instance, when residing in Cambridgeshire I was in

* Does the author draw the proper distinction between "foot-rot" and "sore feet?" I can scarcely conceive a more dangerous error than the belief that foot-rot is not infectious. If it were acted upon it would more than decimate our flocks in the course of a very few years.—W. YOUATT.

In differing from such an authority as Mr. Youatt I may be considered presumptuous, yet, feeling convinced by my own experience that I am right, I still maintain that "foot-rot" is not very infectious. The sheep alluded to

the habit of purchasing ewes from a distant county, and generally on their arrival found several affected with the foot-rot. They were allowed to run with the other sheep, but the disease did not spread to any extent, seldom above three or four of the flock being slightly affected besides the new comers, and in a short time by attention

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were purchased in Devonshire, and from a flock seldom or ever free from the complaint. They were sent to London in a steam-packet, and some of the lame ones conveyed from thence in a cart. It is therefore clear it could not be "sore feet" occasioned by travelling. I have often found both fore feet much diseased, and the hind feet perfectly sound; this, to me, appears a proof of my assertion. The disease prevails most in small woody enclosures where the land is of a rich quality, and is very troublesome in the autumn. I consider that one of its chief causes originates from the dew remaining on the rank pasturage, under the hedges, whilst the centre of the field is free from it; the feet of the sheep in consequence are alternately wet and dry. These frequent transitions tend to harden the hoof, or *vice versâ*, and end in producing a soreness between the claws, which, if not immediately attended to, ulcerated, corroding the hoof, &c. &c.—THE AUTHOR.

I have never heard a doubt expressed by any farmer with whom I have conversed on the subject, of the foot-rot being contagious.—F. BURKE.

"There is much doubt whether the foot-rot is contagious; it may in some degree be so, by inoculation, when the disorder is at the worst, and a discharge of the acrid matter is left on the ground. The writer had the care of 700 ewes in the year 1829, and found that the flock suddenly fell lame, in the autumn of that year, from foot-rot; no cause could be assigned for such an occurrence: after considerable time a cure was effected, and it did not again appear until the autumn of 1839, a space of ten years, when it a second time broke out, and, in the course of a few days after the disorder had re-visited the flock, nearly half of the sheep were affected. I should, therefore, suppose the cause to be one and the same, although a part of the flock in the first instance escaped its ravages. It is highly desirable, in order to effect a quick and certain cure, to dress the whole of the flock, whether lameness has shown itself or not, as the disease takes place several days before the lameness becomes visible; and by dressing the sheep in this early state of the disorder the cure will be greatly facilitated. I have never found a cure so soon produced as by using butyr of antimony, after paring the foot in the usual way, care being taken to put the antimony between the claw of the foot with a feather."

These remarks were written by John Rusbridger, Esq., my Agent in Sussex, and who for many years has had the superintendence of my Southdown flocks in that county. The autumns of 1829 and 1839 were both very wet.—RICHMOND.

I unfortunately had a good deal of foot-rot some years ago, and am decidedly of opinion that it is infectious, and I think the more so on good pasturage than on poor, unless great attention be paid to the sheep's feet being regularly pared; and I do think that Mr. Cleeve has not by any means laid the proper stress on the requisite paring of the flock's feet; for in good pasturage, where the sheep has to ramble very little for his food, his feet are more liable to grow and form pockets over the sole, so that the matter left by the diseased foot is the more liable to be taken up and retained; whereas, on a poor pasture, the animal is more on his legs, and consequently the wear is equal to the growth of the horn, and the flock far less liable to have the foot-rot communicated to them. I remained free from this dreadful disease

it was easily eradicated. It seems, therefore, more probable that it arises from some peculiar cause connected with the nature of the soil and situation to which all the diseased sheep are equally exposed. It is very possible that, where a discharge of acrid matter is left on the ground, other sheep may become affected, or perhaps inoculated, by treading on it, as no doubt was the case in the few instances I have recorded; but the rapid extension of the disease which I have often witnessed must arise from some other source. The cure is easily accomplished by an experienced person. The lame sheep being separated from the rest of the flock, the hoof must be cut away with a sharp knife (called a sheep-foot knife, by cutlers) as far as the disease has spread, and which may be traced by its becoming divided from the internal parts; this must be particularly attended to, for unless the sore is probed to the bottom no application will be of service. When this is done the ointment (Appendix, No. 5), will often prove effectual at one application. It is wrong to use too strong a caustic, as it dries up the surface too quickly, and matter forms beneath.

Another form of this complaint, and known also by the names of *foot-halt, lore,* &c., and much more difficult of cure, generally proceeds from a strain or blow. It commences with a visible enlargement of the foot, accompanied with great inflammatory action. This continues to increase until suppuration takes place, when matter is discharged from between the claws and just above the coronet.

In treating foot-rot of this character, the same course which I have recommended in the preceding disease designated by the same name will not be successful. The most judicious treatment is to promote suppuration as quickly as possible. For this purpose, I have found nothing so effectual, after well fomenting the parts with warm water, as an application of Venice turpentine on some tow, which must be confined to the foot by means of a stout rag. It should be examined three times a-week, the fomenting process renewed, and a fresh plaster applied. Should any fungus excrescence appear, it must be removed by caustic. When there ceases to be a discharge of matter, the plasters may be discontinued, and the foot will soon become sound.

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for two years, till the autumn of 1839, when having bought some sheep which unfortunately broke out with it, it spread through most of my flock. I have now only some six or seven left lame, and they are fast recovering. My plan of treatment has been very simple: I strew the floor of a large shed all over with quick-lime, and put the sheep in every morning for about a quarter of an hour, and in the afternoon dress the foot alternately with butyr of antimony, and finely-powdered blue vitriol; and I have generally found them recover after a few dressings. In wet weather, it will be found very beneficial to wash the diseased feet with strong lime water.—W. GREAVES.

There is in the foot of the sheep a small aperture called the biflex canal, placed just above the division of the pastern. It secretes a mucous fluid for the protection of the joint, and as this secretion is sometimes perhaps by a little inflammatory action carried to excess—whether it is of an acrid character or not I cannot say—it has a tendency to produce ulceration of the surrounding parts that occasionally proceeds to mischievous extent. This complaint is very different from the foot-rot, although generally classed with it, as the foot itself remains perfectly sound, the ulcers being confined to the parts above the hoof. Strong caustic applications are frequently all that are necessary towards effecting a cure. The ointment recommended for the foot-rot is very serviceable, as also butyr (or, as it is commonly called, butter) of antimony.* I have sometimes found it necessary to poultice the sores; for this purpose one of linseed-meal is a good application.

Thorns when allowed to remain in the foot will cause matter to form and produce considerable inflammation. The hoof must be pared away to allow a free discharge, and a plaster of Venice turpentine applied as recommended for foot-rot.

WOUNDS in sheep are not very frequent, unless from the bite of dogs, or lacerations or punctures of the legs. Where the wound arises from a blow, a fracture of the limb often follows. In this case the bone must be carefully replaced, so that the two ends at the point of separation may be carefully set in their natural position; and they must be retained in that position by splints and bandaging for about a fortnight. If the fractured bone protrudes through the skin, the superficial wound must be enlarged by the knife so as to restore the bone to its proper place, and splints must be applied as in a simple fracture; but the cure in this case is likely to be so tedious as to make it more expedient to kill the sheep at once. Should the bandage occasion a swelling of the limb before it is safe to remove it, it may be eased by dividing it at the edges with a pair of scissors, without untying it. All simple wounds are to be treated in the same way as in the human subject, and Nature has given to animals a facility of healing which is too often denied to man. If the wound is extensive, a suture should be applied, always being careful to bring the opposite lips as closely together as possible, and having previously washed

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* The butyr, or chloride of antimony, a sufficiently powerful superficial caustic, and, except inordinately used, being incapable, from its peculiar affinities, of producing any deeply-seated mischief, is beyond all comparison the best general application for foot-rot.—W. YOUATT.

I have found the ointment equal, if not superior, to the Butyr of Antimony, from an extensive practical trial of both, and a box of ointment is infinitely preferable to carry in one's pocket to a phial bottle of caustic.—THE AUTHOR.

away all dirt, splinters, or foreign substances with a sponge and warm water. Where the wound is not extensive, a simple bandage of old linen, carefully and rather tightly wrapped round the limb, will make the incision heal by the first intention. Should the injury be occasioned by a splinter or thorn it must of course be carefully extracted before the wound is closed, and, if any contusion has attended the accident, bran poultices will form the most useful applications. In the case of simple cuts, tincture of myrrh or friar's balsam will stay the effusion of blood and promote the healing, and, what is of great consequence in warm weather, keep the flies from irritating the wound; but, should any considerable vessel be opened, it will be necessary to take it up by passing a thread underneath it, and tying it tightly. The ligature should generally be made of waxed silk. It may occur that a small artery is lacerated, and in some place where it is difficult to pass a ligature round it; in such cases, if the artery (provided it is not large) is fairly and completely divided by a penknife, or lancet, the wounded extremities will generally retract by their muscular action, and, being covered and pressed by the surrounding integuments, the blood will soon cease to flow.

This seems a proper place for explaining, for the benefit of such of my readers as are as deficient in scientific knowledge as myself, the ordinary stages in the sanatory progress of wounds. Where they are produced by a clean and simple cut, without contusion, they will heal by the first intention, as surgeons technically call it; that is, the separated parts will unite by inflammatory action, if the sides of the wound are drawn together either by stitches or by adhesive plaster. If, however, either by contusion or by other causes, a considerable portion of the integument happens to be destroyed, the inflammatory action, which is always the first and immediate effect of a wound, will produce a sore of greater or less extent and depth in proportion to the injury that has occurred. This sore suppurates or discharges a fluid matter At first this matter is acrid and thin, of a light whitish colour, and sometimes having a greenish tinge; but, if the sore progresses favourably, the fluid becomes more yellow and thicker. It is followed by granulations, or little risings of flesh of a bright red, the edges of the sore are perceptibly diminished, and the florid granulations fill up the space left by the destruction of the integuments, the centre of the sore being always the last to heal. It often happens, however, that either from a sickly constitution, or from the accidental introduction of dirt or foreign substances at the time the wound was received, the healing process is interrupted. Sometimes the granulations have a livid instead of a florid hue, and appear puffy, such as is commonly known by the name of *proud-flesh.* In such cases a gentle application of caustic will remove the fungus cha-

racter, and restore the proper secretion of healthy matter. In other instances the sore deepens instead of becoming daily more shallow. This proceeds either from the deposit of some latent splinter, or dirt, in which case poultices are beneficial to promote the discharge of the foreign matter, or it is occasioned by the acrid character of the fluid corroding the adjoining parts. Poultices are useful in this case also; but, if deep sinuses are formed, they will probably require to be laid open with the knife. Wherever a sore assumes this fistulous appearance, it indicates a necessity for sustaining the general system by bark and tonics. It may also be laid down as a general maxim, that, whenever the inflammation becomes violent and extensive, it should be promptly checked by fomentations and poultices, and, if a vital part is menaced, by the free use of local bleeding. This simple explanation, concise as it necessarily is, will materially assist in forming a judgment whether our four-footed patients are progressing favourably to a cure, or whether their case is hopeless and not worth the expense and trouble of further attention.

The Scab, or the Rubbers, is a complaint so well known to every breeder, by its mischievous effects and highly contagious character, that it seems scarcely necessary to describe it at any length. It originates, like some other cutaneous complaints, in the propagation of vermin in the skin. In its commencement the cuticle appears unnaturally red and florid. This is followed by a pustular eruption, accompanied by extreme itching. The confluence of the pustules, when breaking, occasions an extensive sore, and this is soon covered by the scab: but the healing process does not proceed, for the itching causes the sheep to rub himself against the posts and rails until the scab is removed, and the sore is made worse by exposure. At length the animal dies of exhaustion; about a fortnight occurring between the first infection and the pustular eruption.

Although fat sheep, or those in improving condition, seem less liable to be attacked with scab than others, it is not, as some have supposed, a disorder in the blood, and to be cured by change to richer pasturage: it is strictly a cutaneous and local disease, although, like other local complaints, it will seriously and even fatally injure the constitution if not checked in its early stages. If speedily discovered sulphur ointment will prove a remedy, but in more serious cases in order to effect a cure it is necessary to dress the sheep with the mercurial ointment given in the Appendix (No. 1), which operation is performed according to the following directions:—Divide the wool in two parallel lines, about two and four inches from the back on both sides, and also one line down the shoulders and thighs; lay on the ointment close to the skin with your forefinger as you make the divisions; lay another

furrow or line down the throat, under the belly, and between the fore and hind legs; at the same time examine carefully for the affected parts, and dress them.

Three pounds of the ointment are sufficient for a score of large sheep, and two pounds and a half for hoggets or sheep in low condition.*

Highly useful as this preparation is for the cure of so troublesome a complaint, and much as it is recommended, yet there is scarcely a farmer that has used it without the loss of sheep from its injudicious application. October and March are the proper months for dressing when the weather is dry; nor should it be delayed to a later season. In hot weather the absorbent vessels carry it too quickly into the system, and the sheep become salivated, and also in the winter, from lying on the cold and wet ground. I was once persuaded by a veterinary surgeon to dress 300 lambs in August: although I was very careful in not applying more than 2 lbs. of the ointment per score, yet, for two months, I had to regret my folly, having, in that time, lost 62. I mentioned this to a cattle-dealer at Cambridge, who said I must have laid it on too strong, for that he had just dressed 50, and saw no fear of his; but when I met him about a fortnight after, the tale was altered, and 15 had died. Instances of losses from applying the ointment in the winter months are too common to need any caution from me. It is highly dangerous to use it on ewes before or after lambing, nor is it safe at any time to anoint sheep that are poor or weak; but the following infusion will answer the purpose when it is improper to use the mercurial ointment:—

Boil half-a-pound of tobacco in two gallons of water until reduced to one; strain and then add half-a-pint of spirit of turpentine, and half a pound of flowers of sulphur: on the application of this mixture the scabs should be broken, and every affected part well searched and dressed. As this decoction, as well as the ointment, stains the wool and disfigures the sheep immediately after they are shorn, I generally use the lotion (Appendix

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* I have found, in my own experience, half the quantity to be sufficient.—J. W. Childers.

We have many remedies for the scab (or shab), which by great care and unremitting attention will cure it. Of late, in the neighbourhood of Newbury, a new remedy has been introduced for it by a person who travels from farm to farm dipping sheep for the ticks. He applies other ingredients with his mixture, and dips them the same as for the ticks, which is a great saving of time and expense, and much better for the sheep than the plan of continually catching them to dress them; and if it should succeed in future, as I understand it has already done, it is likely to supersede every other remedy.—W. Humfrey.

The chief ingredient in this remedy is probably corrosive sublimate.—The Author.

No. 2), first washing the animal well with soft soap and warm water.

I also recommend the use of aperients, as also bleeding from the eye-vein in sheep much diseased. Two ounces of Epsom salts would be a sufficient dose; and in administering medicines internally some care is necessary to insure their reaching the stomach. They must be swallowed slowly, not forced down, otherwise they will be precipitated with such force as to open the paunch in their descent, and will remain there instead of entering the stomach and bowels; for the structure of the parts is such as to admit of this misdirection of the medicine. A six-ounce phial is a convenient instrument for the gradual introduction of fluid medicine.

To return from this digression. Every infected sheep should be removed from the flock as soon as dressed, and until there is a satisfactory proof of its convalescence. Even here, however, the anxiety of the farmer is not at an end. The complaint is probably more contagious than any other that can be mentioned. It has often happened that, after all the stock has been sold and replaced, the new comers have been speedily infected. This is occasioned by coming in contact with the fences against which the diseased sheep have been in the habit of rubbing themselves; the wool left on the posts retaining some of the eggs or larvæ of the vermin, and of course communicating them to the new flock. The prudent farmer should therefore cause all flakes of wool remaining on the hedges to be carefully collected by his boys, and he should also remove all useless posts, and paint or tar the gates, or wash them with a solution of the chloride of lime, before he uses the same pastures again.

Some complaints have been erroneously confounded with the scab, and much inconvenience and even mischief has arisen from the mistake, all the usual remedies to avoid contagion being taken unnecessarily. Hard and scurfy eruptions, and some species of the ticks, have been considered to be scab, and treated accordingly. The shepherd will be guided in his judgment by the actions of the sheep; if he observes that the painful itching and incessant rubbing are wanting, he may safely conclude that the attack is not scabby in its character. In some parts of the country the scab in its most virulent form is known by the name of "Wildfire." It becomes a species of erysipelas.

Pelt-rot may be here mentioned, less as a specific disorder, than as a frequent effect of scabby eruptions. It consists of a spontaneous falling off of the wool. It is sometimes produced by febrile attacks, as often happens with the human being after severe fever. In other cases I have known it to be constitutional, returning at regular periods, and most usually once a-year. Ewes suckling twins seem to be very liable to it, probably from the poverty of

condition, brought on by too much nursing. When the shepherd perceives one of the flock losing its fleece he ought, by immediate shearing, to save the wool, and, if the skin appears scurfy, it should be anointed with lard, or linseed or other oils. If the weather is severe at the time of this premature shearing, the animal should be clothed in a coarse canvas jacket lined with flannel.*

The Fly.—Sheep are most liable to be struck by this insect in the months of August and September, but it is a very prevalent complaint during the continuance of hot showery weather. It is caused by a large species of fly, which select the wool of the sheep for their nest, and generally settle underneath the tail. Inattention to cleanliness, by allowing the dung to accumulate on the part, is one of the chief causes. The sheep betrays its uneasiness by refusing to feed, and by various contortions of the body in its endeavours to rid itself of its troublesome parasites, which a little experience will easily detect. Too much attention cannot be bestowed on the flock by the shepherd to discover the affected sheep, for, although the discolouration of their wool, and the uneasiness which the animal manifests on most occasions, might seem enough to attract attention from the most superficial examination, I am persuaded, by experience, that, without the strictest scrutiny, many of the flies will be passed over, the coat become injured, and not unfrequently the sheep destroyed, before it has been discovered that it is seriously ill. To guard against this, the flock should be counted *twice* a-day, for often when a sheep is struck it will run into the shade of a deep ditch for protection, and there remain undiscovered. The flock should be separately examined, one by one, before the flies are busy; and, during the day, it should be carefully noticed whether flies are inclined to settle on any particular sheep; and if so, on close inspection of that sheep, it will be found that there are fly-blows or maggots, even though the animal at the time seems insensible of it.

The best application for the destruction of the maggot is the scab-ointment given in the Appendix (No. 1), especially if the skin be much broken, as it assists to heal the wounds and keeps the skin from cracking. The ointment must be laid on and a little beyond the affected parts, separating the wool in furrows, and closely applying it to the skin; after this is done the wool should be carefully brushed backwards and forwards with the fingers, when the maggots will very soon roll out. The sheep should be

* If thus dressed, should not the jacket be rendered impervious to wet, either by the outer covering being made of water-proof material, or by smearing it with pitch? for the rain will otherwise penetrate through it to the flannel, which will retain the moisture, and thus keep the animal constantly damp and cold.—F. Burke.

examined again in a few hours, and if any have been overlooked in the first operation they will now be found in small clusters, when another application of the ointment will generally be sufficient to remove them altogether.

In cases where the sores are so numerous and extensive that the ointment cannot be prudently used in adequate quantities, the wool being closely removed, the parts should be bathed with milk, a small quantity of white-lead scraped on, and then linseed-oil applied with a soft brush. This treatment should be repeated daily until the cure is completed; a covering being provided for the animal to protect it from flies.

If a lotion is preferred, the one found in the Appendix (No. 2) is equally efficacious for destroying the maggot, but it is a harsh remedy and injurious to the wool.

In order to prevent the fly from blowing in the wool, it is a common practice in the west of England, about a month after shearing, to smear the sheep over the back and round the tail with a composition of sulphur and hellebore; given in the Appendix (No. 3).*

There is another complaint, commonly called SORE-HEADS, which is also caused by the fly, but a smaller and distinct species from the preceding, and is most troublesome in woody enclosed districts. The flies settle on the head of the sheep, which causes them to strike at it with their hind feet; hence the skin becomes wounded, when the insects, settling on the abrasure, quickly extend and deepen the sore, and annoy the animals to such a degree, as to prevent them from feeding whilst their tormentors are on the wing.

I have tried various remedies, but found nothing better than the grease on the axle-trees of carts, called cart-gum—a composition of tar, grease, and oil. Spirit of tar is also an excellent application, from its smell being offensive to the fly.

In order to apply the dressings the flock should be had into the fold (if not already there) early in the morning, and, as their

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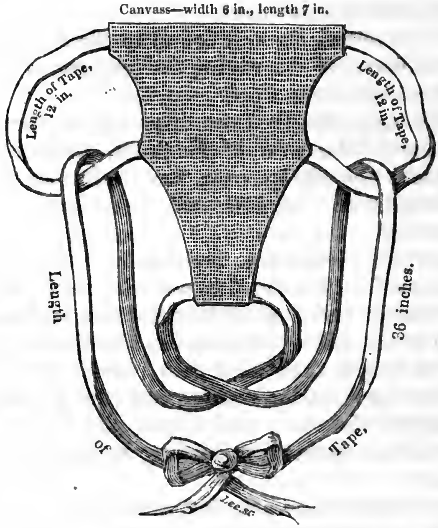
* I have tried several remedies, and all of them have destroyed the maggots. It is injurious to the flock to be driving them about to catch those affected by the maggot, when the weather is warm. The best mode of proceeding that has come within my own experience is to dress the lambs with the powder, when the fly appears early in the spring, and to have them dipped for the ticks early in the autumn, which prevents the fly from attacking them late in the season. There is danger in dipping lambs early in the season, when young and tender, and I have found by experience that when dipped very early, they have been struck with the fly late in the season; therefore, the application of the powder (which is an excellent remedy to prevent the fly from striking, and in which there is no danger to the young lambs), and dipping them early in the autumn, is a safer course in the eradication both of maggots and ticks.—W. HUMFREY.

heads are dressed, let them out, or they will rub it off against each other. Capping them is the best system (when they have been allowed to get very bad), not by sticking the caps on the head by means of pitch or any adhesive mixture, which, from its irritating the wound, they soon kick off, but made according to the following pattern. Under this, and over the sore, to prevent the canvass from drawing it, apply a piece of white sticking-plaster; and, let the head be in ever so bad a state, this will effectually cure it without any further trouble.



The wide part of the cap must be placed on the top of the head, and the ears brought through the loops: the strings at the bottom of the cap are to be first crossed beneath the lower jaw, and then passed through each loop on the opposite side, brought down, and tied under the throat.

The Ticks are a kind of lice, frequently producing a scabby eruption on the skin, that not only occasions considerable annoyance to the sheep, but, like the disease commonly known as the Scab, injures the fleece very materially. Mercurial ointment will soon remove the intruders, or, if the warmth of the season renders it dangerous to incur the risk of salivation, tobacco-water will have the same effect; the tinge, however, that this gives to the wool makes it a less convenient remedy if the mercurial ointment can be safely applied. The lotion, No. 2, would be better than either of these.

The remedy used by Mr. Coke (now Lord Leicester) is tobacco, soft soap, and white calx of mercury, in the proportion

of 2 and 2½ of the first two, and 1 lb. of mercury, to 8 gallons of water. This will dress three score of sheep.*

When very numerous in lambs, as is often the case a short time after they are weaned, an excellent remedy is to dip them according to directions given in the Appendix (No. 4). This will not only eradicate the tick but materially improve their appearance, and, in a great measure, prevents the fly from depositing their larvæ in the wool.†

These are all the cutaneous diseases to which sheep are usually liable. There may be others found in parts of the country with which I am not familiar, and perhaps varieties even of those that I have mentioned may appear under forms so different as to render their identity questionable. But in all cases of eruption, and especially if several of the flock are simultaneously affected, the diseased sheep should be separated from the others, and mild mercurial ointment applied, or, where circumstances do not admit of its safe application, tobacco-water may be used as a substitute.

There are many other disorders of occasional, and, in some places, of frequent occurrence, more particularly those of a febrile character; but the above are more or less common in all flocks, and it would make my treatise too long for any useful purpose if I were to introduce all that has been written or reported upon every disorder of which experience has proved the sheep to be susceptible: some, even of those that I have mentioned, occur too rarely to make any lengthened observation on them desirable.

After thus enumerating, at greater length than I at first in-

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* An application having been made, by direction of the Duke of Richmond, for the purpose of obtaining correct information respecting the present mode adopted at Holkham, the Earl of Leicester has communicated to the Society the following authentic document:—

Recipe for Dressing Sheep to Destroy Ticks, &c.

1½ oz. white arsenic	to 1 gallon of water.
3 oz. of soap	to ditto.
2 oz. of tobacco	to ditto.

The arsenic must be boiled in a bag, and kept stirred at the time of boiling. The tobacco to be boiled in a bag, and put into the water when cold. The soap to be cut into thin slices; and boil the whole of the mixture well for half an hour.

One pint and a half of this water to be applied to one sheep.

Leonard Loose, Shepherd, Holkham.

17th Jan. 1840.

† It is better to dip the lambs immediately after the ewes are shorn than after weaning. The shearing the ewes destroys or removes the ticks which were upon them, and the dipping destroys those which were upon the lambs; whereas, if it is postponed till the lambs are weaned, the wool on the ewes will have then grown long enough to shelter ticks which have come upon them from the lambs after the time of shearing.—Spencer.

tended, the ordinary diseases of sheep, I will beg the attention of the sheep-master to some precautionary rules, which, at first sight, may appear commonplace, but which, experience daily tells us, are too much forgotten in practice. The object of the farmer ought to be to grow as many sheep on his farm as is consistent with the feed it supplies, and if he exceeds or falls short of this just proportion he will either way be a loser. This is too obvious to require much illustration. In the former case the sheep are starved, and will neither do justice to the land nor pay when sold to the butcher: in the latter much valuable food is wasted, and his profits, as a matter of course, diminished. Another point of consideration is the sudden change of food to which some subject their flocks. The majority of the diseases that I have mentioned in the preceding pages proceed from a sudden change from a scanty to a luxurious diet. It is no uncommon occurrence to see a flock, which has been nearly starved during the winter, suddenly turned into abundant pasturage on the approach of spring; or others, which during summer and autumn have received little attention, and been hardly folded, abruptly put into coleseed or turnips. Diseases arising from indigestion and repletion soon follow, and the farmer is astonished at the extent and rapidity of his losses. All this might have been avoided by making the transition a little more gradual. At night the sheep should be removed from their new feed, good sweet hay should for a time form a considerable portion of their diet, and, by slow degrees, the flock might be initiated, as it were, into the full enjoyment of their rich succulent provender.

Again—a farmer sometimes attends a fair, and purchases a lot of sheep that have been driven a long distance, and for several days have had little better grazing than they could pick up along the side of the drift-way. When he gets them home he immediately turns them on to his best grass, and, by this imprudent act, introduces fever or dysentery into the flock. Had he, on the contrary, placed them on a short, cool pasture for a few days, their condition would have improved, and the tone of their stomach and bowels have gradually risen to due strength for the reception of richer food.

The farmer, on purchasing his stock, would do well to inquire into the description of the soil to which the lot had been previously accustomed; and also into their previous habits, as whether they had been folded, &c. If the sheep have been bred on land much superior to his own, he would be wise to reject them, for they are unlikely to thrive on inferior pasturage. If they have come from inferior soils, he must be very careful in preparing them, by gradual indulgence, for the richer feed to which they are about to be ransferred.

I will add but one more observation. A wise farmer will never confide his flock to the exclusive and unwatched care of his shepherd, however clever or trustworthy that servant may be.

I shall now proceed to a short review of those complaints which are incident to parturition and call for obstetric aid; and before I enter on this topic, a few general remarks on the subject of breeding may not be out of place.

It has long been a disputed point whether the system of breeding *in-and-in,* or the opposite plan of frequent crossing, is the most certain of maintaining the character of the stock. Mr. Bakewell always adopted the first plan, and with success: arguing from nature, there is certainly great reason to believe that, with gregarious animals, it is the proper course; for that herds of deer and wild cattle, which can only breed in close affinity, maintain their peculiar qualities without degeneracy, is notorious to every naturalist, so long as the pastures over which they range are adequate to their support.*

Note by Professor Owen.

* In reference to the important and interesting question of the disadvantage or otherwise of the system of *breeding in-and-in,* I reply, that, in common with most other physiologists, I regard it as likely—I may say certain—to end in the deterioration of the stock; that is, if the system be strictly adhered to. One can readily understand that in a good stock—say of sheep—it may be long before the ill effects of the *in-and-in* system begin to manifest themselves, because such a flock may be compared with the human population of one of the small islands of the Pacific. Here, though the community be small, marriages may take place between cousins removed to the sixth, eighth, or tenth degree:—all indeed of the same stock or race, but of degrees of consanguinity sufficiently remote to obviate the bad consequences of the system of breeding *in-and-in* understood in a strict sense. I would beg to observe, however, that with regard to those ruminants which are perhaps the most gregarious, and at the same time localised in a state of nature, as the deer, a special provision seems to have been made, in the peculiar economy of the growth and shedding of their antlers, to secure the propagation of the greatest part of the herd to the strongest males, when at the period of their greatest perfection. The antlers, as is well known, increase in length and the number of snags, as they are successively reproduced each year, until the hart or buck has attained his primest strength and activity. He is then able to beat off both the younger and the older and heavier males, and to choose his seraglio of does or hinds, which become the mothers of the greater part of the next produce.

It is thus, I suspect, that the ill-consequences of breeding *in-and-in* are in part obviated in the fallow-deer of our parks. With respect to the red-deer in their wilder and more extended ranges, the intermixture of the blood of different herds is more likely to take place. I am not aware of any experiment where breeding *in-and-in* has strictly been carried on through many generations; that is, where a male and female offspring of the same parents, have been put together, bred from, and their progeny in like manner prevented from making other alliances. This should be done before the system of in-and-in breeding can be decidedly pronounced to be a deteriorating one or not, and then the experiment might be modified, to

It is also within the experience of every farmer in large breeding counties, that, in certain cases where a remarkably good stock has been acquired, the breeder is even jealous of the introduction of a stranger into his flock, and proceeds on the *in-and-in* system for many years, with no perceptible falling off, and indeed generally with obvious improvement in his breed.

Lord Somerville, whose name is high as an agricultural writer, was decidedly opposed to crossing dissimilar breeds; and Dickson, in his 'Practical Agriculture,' ranges himself on the same side. On the other hand, it has fallen within the observation of every person, that, even in the human race, frequent intermarriages in the same family, in successive generations, have a tendency to reduce the offspring in vigour and size, and to perpetuate constitutional affections. So, again, to return to the animal creation, it is perfectly understood that the race-horse degenerates in speed, and especially in strength, if too much of the same family is allowed to remain in the stock: while there is scarcely any sportsman, who has been in the habit of breeding his own dogs, that has not perceived a gradual but certain diminution of size and power in such as are bred on the *in-and-in* principle. I have been informed by a friend, who for many years has had in his kennel a particular and valuable pointer breed, that he has uniformly found all the puppies weak and diminutive after the third degree in lineal descent, if bred without a cross; though the properties of scent and docility seem in no measure lost. The truth would seem to lie between the extremes. It is well known that in all animals like begets like, and that this principle is so general that faults and defects, as well as strength, size, and other qualities, descend hereditarily. So long as the inherited qualities are on the favourable side, it would seem impolitic to cross the blood; but, if, in the course of time, any peculiar deficiency of form in the proportion or symmetry of the animal becomes conspicuous,

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ascertain the extent of deviation from strict in-and-in breeding requisite to check its ill effects.—*January 25th,* 1840. RICHARD OWEN.

In communicating this note, kindly transmitted at my request by Richard Owen, Esq., F.R.S., Hunterian Professor of Comparative Anatomy to the Royal College of Surgeons, and Vice-Chairman of the Zoological Society, I may remark, that whenever, in my South Down flocks, breeding in-and-in has been tried, I have found the produce deficient in size and constitution. In my park at Goodwood, the fallow-deer are smaller than formerly; I believe, because no fresh blood has been introduced. In the Highlands of Scotland, it is well known that the Red Deer Stags often, at the rutting season, travel many miles to other forests, where they remain for a certain time, and then return to the district from which they came. In-and-in breeding is, therefore, to a certain extent avoided, and the deer have not, as far as I can learn, degenerated.—RICHMOND.

it will be prudent to introduce a different stock, excelling exactly in those points where the breeder feels his own to be defective.*

There are one or two general maxims, connected with breeding, which I may be allowed to mention.

It is a common ambition with the farmer to choose a ram that will produce a large and early-fatting stock. Where the pasturage is rich and abundant, this is a correct principle; but the breeder must be governed by attentive consideration of these circumstances. He must regulate the size of his stock by his means. A kindly disposition to early fattening is of course a powerful recommendation of the ram, but, if the progeny is larger in size than is consistent with the economy of the farm, the breeder will not eventually prove a gainer.

The particular defects of the existing stock should be closely considered in the choice of a foreign ram. Perfection of form and disposition combined are the great objects. A perfect form in a sheep, or indeed in any animal, is rather matter for the eye to judge of than for verbal explanation; still it may be observed, that just proportion of all the parts, vivacity of eye, roundness, depth, and capacity of chest, a straight back, clean and upright limbs, rotundity of barrel, and breadth of loin, are regarded as the principal and best points of a sheep; and it will usually be found that, where this symmetry of appearance is combined the disposition to fatten early will accompany it.† A practical man will scarcely require the caution that, in a well-conditioned sheep, it will be prudent to form his opinion by the frame of the animal, and not by the roundness and beauty of his outline, for that may be occasioned by his apparent condition, artificially got up for show, while his actual and true form will be found, on handling, to be imperfect.

I consider the following to be a very correct definition of the figure and points of a perfect New Leicester sheep:—"The head should be hornless, long, small, tapering towards the muzzle, and projecting horizontally forward; the eyes prominent, but with a quiet expression, and not placed far asunder; the ears thin, rather

* There can be no doubt that fresh blood in a flock is absolutely necessary to keep up the constitution; you may retain your good shape and aptitude to fatten, but by breeding too long in-and-in you will lose that strength of constitution which in South-Down sheep especially, after all, is that which has spread them over the whole kingdom, and has made them so valuable.—John Ellman.

† I am of opinion that even the most sanguine are not aware of the difference in profit between feeding-off ten acres of turnips, and hay in proportion, with well-bred sheep (that will lay on flesh quick, and bear a heavy fleece of wool), and with those of an inferior description (slack made, thin-chested, light-coated, meagre sheep), unless they have actually proved it.—W. Humfrey.

long, and directed backwards; the neck full and broad at its base where it proceeds from the chest, but gradually tapering towards the head, and being particularly fine at the junction of the head and neck; the neck seeming to project straight from the chest, so that there is, with the slightest possible deviation, one horizontal line from the rump to the poll. The breast broad and full, the shoulders also broad and round, and no uneven or angular formation where the shoulders join either the neck or the back, particularly no rising of the withers, or hollow behind the situation of these bones. The arm fleshy through its whole extent, and even down to the knee. The bones of the legs small, standing wide apart, no looseness of skin about them, and comparatively bare of wool. The chest and barrel at once deep and round, the ribs forming a considerable arch from the spine, so as in some cases, and especially when the animal is in good condition, to make the apparent width of the chest even greater than the depth. The barrel ribbed well home, no irregularity of line on the back or belly, but on the sides the carcase very gradually diminishing in width towards the rump. The quarters long and full, and, as with the fore-legs, the flesh extending down to the hock: the thighs also wide and full, the legs of a moderate length, the felt also moderately thin, but soft and elastic, and covered with a good quantity of white wool, not so long as in some breeds, but considerably finer."—*Youatt on the Sheep,** p. 165.

* The following is my own account of the points, &c., of the New Leicester Sheep, which, although not so scientifically drawn up, has perhaps the merit of correctness and originality:—The head devoid of horns, and rather small for the size of the animal, with an expansive and flat forehead; eyes clear and prominent; the part underneath the eyes deer-like, with black and distended nostrils; the ears long, thin, and pointed: some countenances have a blueish cast, whilst others are thickly covered with short white hairs. The neck small at its junction with the head, slightly arched, and gradually increasing in size, until lost in the bosom; throat clean, and free from superfluous flesh. The bosom or chest wide and deep, fore-legs far apart, small below the knee, and gradually tapering above, until imbedded in the shoulders; in well-fed animals the circumference behind the shoulders is very great, with a proportionably decreasing curvature towards the hips. The back, loin, and hips are in a straight line, the fat at the extremity of the latter protruding over the tail, whilst the loin is broad and full; when in high condition, and possessing perfect symmetry, a small cavity will be discovered on handling, running along the back, but more perceivable over the loins and hips. The tail at its base is wide, gradually tapering to its apex. The thighs are fleshy, but not coarse; the hocks rather crooked; the bone altogether of the legs particularly small. The pelt or skin is thin and elastic, and the animal covered with wool of a moderate length and fineness, varying in weight from 5 to 8 lbs. or more. To this description it may be added that, when the neck is small, the hind-quarters are generally bad, and the constitution delicate; on the contrary, when the neck is large, the animal is coarse and hardy, but does not possess much aptitude to fatten.

THE AUTHOR.

Tameness and docility of temper are qualities of great value, because a sheep of quiet disposition is more inclined to improve in condition. On a similar principle, the breeding farmer will not only consider the quality of his pasturage, but the temperature of his situation. Where the farm is bleak and exposed, it is essential to inquire into the hardiness of the stock which he places on it.

A shearling ram is usually preferred to an older sheep, it being considered that he is more active, and begets a more vigorous produce. When the rams have been unnaturally forced from an early age, this principle is a correct one; but, where no artificial means have been used, the full strength of nature is not fully developed until they attain their second year; and procreation before maturity is almost universally regarded as debilitating to the parent of either sex, while the value of the offspring is by no means insured by it. A remarkable proof of this may be found in the stinted proportions of all the East Indian tribes, where marriage generally takes place at the early age of fourteen. Who that has injudiciously allowed his ewe-hoggets to breed, has not seen this truth strikingly illustrated?

While the ram is with the flock, in order to insure a good fall of twins it is necessary to keep the sheep well and on extra food. It is an excellent practice to withdraw the rams from the ewes once a-day, and to give to each a pint of split beans. The period of gestation with the ewe is about 152 days. It is peculiar to the sheep to be very accurate in its period of gestation, so that in a thousand ewes the probability is that four-fifths of them will not vary above a few days.*

The farmer must be guided, as to the time when he admits the tups, by the provision that he has made for the ewes after lambing. If that provision is scanty, he will find the lambs stunted in their growth. It will also be prudent to begin the riding season not only at such a period as may consist with a good supply of nutritious feed, but with a view to the climate. Although, in the southern districts, the depth of winter may be considered to occur in January, yet there are many places which, being comparatively sheltered or exposed, may be said to be two or three weeks earlier or later than other districts; and, as we ascend northward, the difference of a very few degrees of latitude will be found to vary the season yet more.

These combined considerations seem to point to the month of March as most favourable for the lambs; and, except in very rich

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* M. Tessier, in his Memoir read before the Académie Royale des Sciences, gives a very satisfactory illustration of this. In 912 ewes the shortest period was 146 days, and the longest 157 days, or, reckoning 5 months, 7 days over and 5 under.—W. Youatt.

and sheltered pasturage, I should not recommend an earlier time. Where, however, these advantages are enjoyed, the lambs will fall most profitably in January or February, because they will be sooner fit for the market. The farmer will of course be careful, before he admits the ram, to inspect the ewes closely, so as to satisfy himself that they are all in healthy and good condition. No other preparation of them seems to be required.

I consider 60 ewes to be quite sufficient for one ram. Sometimes, when the stock is highly prized, a greater number is allowed: and I have heard of even 200 lambs having been got by a single ram. In such cases, however, the ram is not allowed to mix with the flock, but the ewes are selected and brought separately to him. This practice was adopted by several friends of mine in the west of England, who used to know the ewes that were ready by employing a teazer, and then bringing them to the ram in succession. But even in this way the ram cannot impregnate more than 100 ewes, with safety to himself, or any degree of certainty as it regards them.*

It has been my practice to mark the breasts of my rams with ochre; and when a score have been served, I dot them on the near shoulder with a brush made of a tuft of wool, dipped into oil and ochre. After the lapse of a week I dot those that are

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* Having chosen rams from the best flocks, it is an excellent plan to put a certain number of ewes to each individual ram, and let them remain separate from the other ewes until most of them have been served, marking the difference in the stock of each as they fall. Should it be found that any of them possess qualities likely to be injurious to the stock, use them no more: if, on the other hand, you find any, or even one, of them produce stock having the combined qualities of a good fleece and a good carcase, employ a teazer marked on the chest with grease and ochre: as fast as the ewes are at ram, put them to the sheep, and allow him to leap them twice, and thus you may have from 100 to 150 lambs, and not distress your sheep so much as in obtaining one-half the number in allowing the sheep to *remain* with the ewes. When the ram is turned in with the ewes, he will leap favourite ewes a great many times to the *neglect of others*, and this is the case when there happens to be only one or two of the ewes at ram: therefore, by adopting the previous plan, you will obtain more of your best blood, and thus improve your flock to fatten and your stock to breed from, without expense or injury to your sheep, thereby making the best of your prize—as a *prize* I call it to possess a ram that produces good stock.—W. Humfrey.

This is already stated, but not so explicitly; in this case it is usual to number the ewes, and take the number down in a book, together with the day of the month on which the ewe was impregnated, a plan which will allow you to form a pretty correct judgment of the day on which the ewe will lamb.—The Author.

It is not very easy to procure a ram perfect in all his points; ewes, therefore, should be selected to be put to him which are good in the points in which he may be the most deficient. This, in fact, is the secret of having a good flock. The expence is but trifling; and if a good flock will not pay I am certain a bad one will not.—Richmond.

signed in the mean time on the near side, then the third lot on the near hip, reversing the side at the next occasion. If any return to be served again, which is usually the case after 15 days, I make a fresh mark on the place to which lot it belongs. This system enables me to draw out my early ewes, and keep them in a yard a few nights before lambing. Many may think it of small importance to know which ewes will be the first to lamb, but my reason is that I dislike the favourite system of keeping them folded (except only for a few nights previous to lambing): it makes them susceptible of cold, and this is often followed by inflammation of the womb. I am aware that the plan of marking my rams with ochre is rather uncertain, for they sometimes leap the ewe without connexion taking place ; but it is the best, and indeed the only one that is practicable. If the ewe has not been impregnated, the failure will be discovered by her returning again to the ram in about 15 days. After the ram has been 2 months with the flock, it will generally be found that all have been served, and then he should be removed. Sometimes he is suffered to continue with them, but the effect of this is that every here and there an ewe will prove in lamb at a late period of the summer, when she is in good condition, and would produce more by a sale to the butcher than by breeding. After the ewes are large, they should be kept quiet and undisturbed. It is not only unnecessary but prejudicial to overfeed them at this time, for it is apt to occasion inflammatory attacks at the time of yeaning. Quiet is also very important, and to secure it they should be only attended by a steady old dog; a noisy, troublesome puppy should on no account be allowed. The fences should be kept in good order, to prevent their breaking ground. If heavy ewes are galloped about by dogs, or allowed to break pasture, it will most assuredly cause them to slip their lamb: these ewes will then be offensive to the rest of the flock, independently of the danger to the ewes and positive loss sustained by the abortions.*

When the period of lambing arrives much care and attention are requisite. The shepherd must receive it as a general maxim to be most attentively observed, that *Nature is the best midwife.* He must not be led by the appearance of uneasiness and pain to interfere prematurely; he must watch the ewe closely, and so long as she rises at his approach he may be assured that, whatever uneasiness she may exhibit, all is well. Much uneasiness is generally apparent—she will repeatedly lie down and rise again with seeming distress. If this occurs when driving her to fold, he

* The ewes ought to have plenty of careful exercise; that is, be brought up at nights into a straw-yard; and if the turnips on which they are fed be a quarter of a mile from the spot, it will be all the better, as all animals with young should have a due degree of exercise.—J. W. Childers.

must be very cautious and gentle in urging her. These symptoms ought to be continued for two or three hours, or even more, before he feels imperatively called on to interfere, except the lamb is in such a position as to warrant fears of losing it. In cold weather particularly the labour is likely to be protracted. Should the ewe appear exhausted and gradually sinking under her labour, it will be right to give her some oatmeal-gruel, with a little linseed, in the proportion of a spoonful of the latter to two of the former.* When the ewe feels that she is unable of herself to expel the lamb, she will quietly submit to the shepherd's assistance. In giving her this assistance, his first duty is to ascertain whether the *presentation* is natural. The natural presentation is with the muzzle foremost, and a foot on each side of it. Should all be right in this respect, he must proceed to disengage the lamb, first *very gently drawing down the legs, and with all possible tenderness smoothing and facilitating the passing of the head with his fingers, rather than forcibly extricating it*—the particular attention of the shepherd being given to these points. This may be effected by passing the finger up the rectum, until he feels the back of the lamb's head, and then urging it forwards at the same time that you gently pull the legs. Sometimes the head is sufficiently advanced, but the legs are too backward. In this case the head must be gently pushed back, and the hand, being well oiled, must be introduced into the vagina, and applied to the legs so as to place them in their natural position, equal with the head. Should the fore feet, on the other hand, protrude, they must, in like manner, be returned, and the same assistance given to advance the head. If the hind quarters present themselves first, the hand must be applied to get hold of both the hind legs together, and draw them gently but firmly; the lamb may often be easily removed in this position. It is no uncommon occurrence to find the head of the lamb protruding and much swollen; but still by patience and gentle manipulation it may often be gradually brought forward; or even Nature, not unduly interfered with, will complete her work, if the pelvis is not very much deformed. Should, however, the strength of the mother be rapidly wasting, the head may be taken away; and then the operator, pushing back the lamb, may introduce his hand, and, laying hold of the fore-legs, effect the delivery. It also often happens that the legs are thrust out to the shoulder, and from the throes of the animal it is not possible to replace them, so as to get up the head of the lamb; by partially

* When the ewe, under these circumstances, requires support, oatmeal-gruel, with treacle and one gill of ale, will be found a warm and comforting drink: and, after a difficult time of lambing, when inflammation is to be apprehended, rye-meal gruel, with a good proportion of treacle (without the ale), will form an excellent restorative.—J. W. Childers.

skinning the legs you may disunite them from the shoulder-joint, there will then be room for the introduction of the hand, and by laying hold of the head you can deliver the ewe. A single season of practice will do more than volumes of writing to prepare the farmer for the preceding and some other cases of difficult labour. But let him bear in mind that as a general rule that the fœtus should, if possible, be placed in its natural position previously to any attempt to extricate it by force. When *force* must be used, it should be as gently as is consistent with the object of delivery. I need scarcely observe that the ewe must be the object of careful nursing and care, until she is completely restored. This will occur very rapidly unless the womb has protruded in consequence of the severity that has been used. In this case it must be replaced without delay, or violent and fatal inflammation will arise from its exposure. When replaced it should be retained in its position by a couple of stitches passed through the lips of the extreme parts. The ewe should be removed to a warm yard for a few days, and fed on gruel twice a-day. Even when the uterus is not displaced, it often occurs that violent inflammation shows itself. Bleeding copiously, if the strength of the animal will admit of it, and opening medicines, are the only remedies on which reliance can be placed. This, and all other similar complaints, are most usual with ewes that have been too well fed during gestation.

The mode of replacing the uterus when it has fallen in parturition, or otherwise, is to lay the ewe on her back, and, while two persons raise the hind quarters by the legs a little distended, the operator, with his hands well greased, will gradually replace the uterus in its natural position, and, before the animal is allowed to rise, two stitches must be introduced by the aid of a curved glover's needle and a very thin strip of white leather across the bearing as to prevent a second protrusion. Leather is the most convenient ligature,* and, when the operation is performed, thirty drops of laudanum may be usefully given to allay spasmodic action.

I have passed over the subject of *inflammation of the womb* rather lightly, partly because its treatment does not essentially differ from other inflammatory and local affections, and partly because when it does occur it is generally an incident to parturi-

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* Small sticks of leather remain much longer without sloughing out than with any kind of silk or twine; but the best material for these and similar operations, is a metallic suture, formed of a kind of Britannia-metal, with a little more than the usual quantity of lead in it. It can be procured at any pewterer's, and will be retained even twice or thrice as long as the leather. —W. Youatt.

I think the metallic suture far preferable to slips of leather, as the latter frequently sloughs off, or unties in a few days.—The Author.

tion, and hence is immediately perceived; but it may not be out of place to call attention to some of the peculiar symptoms by which it is indicated. It mostly makes its appearance on the third day after yeaning. It will be observed by the shepherd that the ewe frequently stoops to pass her urine, as if she voided it with pain, and it is not unlikely that the water will be found high-coloured and tinged with blood. Her breath is short and intermittent; she lies down and occasionally appears to have labour-pains; she droops her ears, and neglects the lamb, as if unconscious of its presence: if slightly pressed on her hind quarters she sinks almost to the ground, and the movement of her limbs is visibly painful and distressing. Eventually the hinder parts swell, mortification ensues while the pain abates, and then death follows rapidly. As soon as the earliest of these symptoms appear, bleeding at the neck should be promptly resorted to, and one bleeding until she faints will be more beneficial than the repeated use of the lancet without fainting. Fomentation of the external parts and those immediately adjoining will afford relief, and an ounce of salts should be given every four hours. I am not fond of injections in such cases, but, if this treatment does not relieve the pain, it may be expedient to inject into the uterus a lotion consisting of four ounces of poppy-heads boiled in four pints of water until reduced to two pints, and then strained, and made with linseed into the consistency of a thin gruel. If the inflammation has attained a considerable height before the disorder is perceived, and there is reason to fear the commencement of mortification, (which will be perceived by increasing debility and decreasing pain,) bleeding and purgatives will be too late, and a strong antiseptic drink must be substituted for them. I have used for this purpose the mixture of bark, ginger, and tincture of camphor, mentioned in the Appendix (No. 9), and I have also poured into the vagina a liniment of soap, opium, and oil, in the form given in the Appendix (No. 10). Little chance however remains of saving life when once inflammation has terminated in mortification, unless the constitution is naturally very vigorous.*

Inflammation of the udder is no uncommon disorder after yeaning, and it often proceeds from the shepherd's neglect. Imme-

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* The mortality amongst the ewes, on ten farms in the neighbourhood of Saffron Walden, during the lambing season, taken on an average of several years, seems to be about 4½ per cent. Early lambing, and permitting the ewes to be at large, tend to lessen the evil; while nursing the ewes, and putting them too early upon turnips, colewort, or rich succulent food, increase it. Some years ago I was assured by several flock-masters, at Ilsley, in Berkshire, that they seldom lost a single ewe in lambing on the Downs, the situation of which seemed to be very much exposed.—BRAYBROOKE.

diately after lambing the ewe should be examined to see that "all is right," and if milk can readily be drawn from both teats there is no danger to be apprehended; but if, on the contrary, the passages appear closed, and the milk is drawn with difficulty, there is reason to fear that it will coagulate in the udder and produce miliary fever. The teats, in such case, should be well fomented with warm water, and persevering efforts must be made with the hand, well lubricated with lard, to draw off the milk. These efforts will usually succeed, but, should the obstructions still continue, recourse may be had to mechanical aid, and a small bodkin or knitting-needle must be thrust up the passages of the teat, in order to remove it. A more common case, however, of suppressed milk is when the ewe having for a length of time been suckling twins; one of them dies, or is removed; the remaining lamb will continue to suck the teat to which it has been accustomed, and the other side becomes distended with milk from the teat not being drawn. The shepherd's attention must always be given to this circumstance, for, if relief is not afforded, inflammation will often ensue. The same will occur when one of the teats has been sore, and the ewe prevents the lamb from sucking on that side.

After weaning the ewe must be placed on the shortest feed, and milked by the shepherd twice or three times at intervals of a day or two. If, after every precaution, inflammatory symptoms show themselves,—and the difficulty of walking experienced by the ewe is one of the most decided,—fomentation long continued is the best remedy, and the camphorated mercurial ointment described in the Appendix (No. 11) will be beneficially applied to the udder, if well rubbed in. If the teats are at the same time drawn with tenderness, matter will probably be discharged from them, and relief speedily obtained. When the udder appears distended, and yet the ewe will not allow the lamb to suck, the shepherd will find that the teats are sore, and he should wash them well with warm water, and rub in the Goulard ointment mentioned in the Appendix (No. 12). The same application will be found serviceable to the lamb if there is any scabbiness about the mouth.

I shall conclude with a very few brief remarks on the manage ment of the lamb.

In cold and wet weather, and particularly after a difficult labour, the lamb will often be found in a half-inanimate state, or exhausted and weak. When this is the case the ewe should immediately be caught, and the teats milked into the lamb's mouth, the shepherd using his best endeavours to make it swallow as much as possible. It should also be well rubbed with straw, particularly the legs, in order to promote circulation. If he succeeds in restoring it to its feet, so as to stand alone, a recovery is

certain; but, if he fails in this, he must carry it into the house and immerse the animal up to the head in a pail of warm water: it should be kept in the bath about ten minutes, taking care to maintain the water at the original temperature. When taken out of the bath it should be put into the oven, moderately heated with a few wisps of straw, first rubbing it perfectly dry, or well covering it with warm flannels. In the course of an hour its bleating will show that it is restored, and it may then be taken back to the ewe, but, for a day or two, it must be carefully protected from cold.

Lambs are sometimes subject to diarrhœa of a white colour and strong smell, coming on usually a few days after birth, the bowels at the same time being distended with wind. This originates in undigested milk, and will be speedily removed by two teaspoonfuls of castor-oil mixed with another teaspoonful of equal parts of ginger and magnesia. This may be given in warm linseed-gruel. If the lamb is strong, and several weeks old, a larger dose, observing the same proportions, will be required. If the purging is not thus removed, ten grains of prepared chalk, with half a drachm of tincture of rhubarb and ten drops of laudanum, given in a little new milk, may check it.

Inflammation of the navel-string, occurring a few days after a lamb is dropped, should be subdued by fomentation and linseed-poultices. A friend of mine, who lost several lambs by this complaint, tried with success fomentations of warm brine.

Swollen joints are sometimes caused by early exposure to wet and cold. The disorder appears to be rheumatic. It is in a great measure prevented by erecting a haulm-stack, such as may be easily shifted when required, so as to afford protection against the severity of the weather. The camphorated embrocation mentioned in the Appendix (No. 13), well rubbed into the affected joints, will speedily restore them.

Castration should be performed when the lamb is about two weeks old, if the animal is healthy and vigorous, but, if otherwise, the operation should be delayed till it acquires strength. No other precaution is necessary than to remove it a night or two afterwards into a dry or warm yard. I do not recommend any injection into the purse—it only tends to cause more inflammation than is requisite for healing the wound. Should the wound not heal favourably, but, on the contrary, be followed by stiffness and continued lameness, it will be expedient to open it again and remove any coagulated blood that may have collected.

A friend of the author, a surgeon, has suggested that it might be advisable to submit the diseases here described, and their treatment, to the test of experiment in different localities, under the direction of committees associated, if possible, with some intelligent veterinary surgeon. A better mode of manage-

ment would probably in many cases be discovered, and the practice of cattle-medicine rescued from the state of comparative ignorance in which it has been too long involved.

*** There is a disease in sheep which, at certain times, is very injurious, and few appear to know how to cure it; it frequently occurs in the early part of the summer, particularly after the sheep have been kept hard during the winter; and before they can recover their condition. I have never known it happen but when they were in a low state of condition. The sheep appear, when attacked, to be labouring with inward fever, attended with cough, which produces swollen lips, completely cased with a thick scab: I have sometimes observed sheep in this state to be nearly starved, and have no doubt that, owing to neglect in this stage of the disease, many have died. The best remedy I have found (and which will generally produce an effectual cure) is by pulling off the scab, which will cause the lips to bleed, then rubbing them well with the prepared oil, and afterwards anointing them with the prepared salve. This method I have generally known to cure 80 out of 100 sheep the first time they were dressed, and on a second application I scarcely ever remember its being attended with want of success.—This ought to be known to all flock-masters.—JOHN RUSBRIDGER.

Recipe for the Prepared Oil.

½ pint of linseed-oil
½ pint of elder-oil
1 oz. of verdigris.

Those three articles to be used as oil.

Recipe for the Prepared Salve.

¼ lb. of fresh butter
1 oz. of verdigris
2 oz. of rosin
¼ lb. of Venice turpentine
½ oz. of alum
2 table spoonfuls of tar.

"The above six articles to be simmered together, and used as ointment."

APPENDIX.

No. 1.

Quicksilver	1 lb.
Venice Turpentine	½ ,,

Rub them well together, without intermission, in a marble mortar until they are well incorporated, which will take at least eight hours; then melt, over a slow fire, 5½ lbs. of hogs'-lard and ½ lb. of resin; when luke-warm add the other ingredients, and keep it stirred until cold.

No. 2.

Corrosive Sublimate	1 ounce
Spirit of Wine	¼ pint

The sublimate to be dissolved in the spirit of wine, to which add three quarts of spring water.

No. 3.

Flowers of Sulphur	1½ lb.
White Hellebore, in powder	½ lb.
Train Oil	1 gallon

To be kept stirred whilst using; many add red ochre, but it stains the wool, and is of no material benefit. If a powder be preferred, one pound of white lead must be added instead of the oil, to be dusted on with a flour-dredge, and afterwards sprinkled over with water, and rubbed well in to make it adhere.

No. 4.

Soft Soap	15 lbs.
Tobacco	2 ,,
Arsenic	2 ,,

These ingredients are to be put together into an iron pot, and boiled with five pails of soft water for half an hour. To two pails of this mixture when boiling hot add five of cold water, to render it about new milk warm, and as it wastes in the operation of dipping it must be renewed in the same proportions. The lamb must be immersed in the liquid, with the exception of its head, for a few seconds; a sort of cradle or ladder must then be put across the tub, so as to admit of placing the lamb on it, whilst the superfluous water is again pressed from it. This will be sufficient for 150 lambs.

No. 5.

Blue Vitriol	½ ounce
Gunpowder	1 ,,

Rubbed together into a fine powder, and mixed with hogs'-lard sufficient to make the whole into the consistency of a paste. This recipe has been practically found to be an excellent remedy, although the second of its ingredients is not a recognised article of materia medica. The following is certainly more scientific and perhaps equally efficacious:—

Acetate of Lead (or Sugar of Lead) .	1 ounce
Sub-Acetate of Copper (or Verdigris) .	½ ,,
Sulphate of Copper (or blue Vitriol) .	½ ,,

Formed into a paste in the same manner as the other.

No. 6 (Mr. Clater's Recipe.).

Nitre, in powder	6 ounces
Ginger, fresh powdered	4 ,,
Red Oxide of Iron (or Colcothar), in fine powder	2 ,,
Common Salt	3½ lbs.
Boiling water	3 gallons

Pour the water hot upon the ingredients; stir them, and when lukewarm add to every quart of the mixture 3 ounces of spirit of turpentine, and bottle for use. Dose: 4 table-spoonfuls every fourth day fasting, repeated for three times.

No. 7.

Compound Tincture of Cinnamon and Tincture of Catechu, of each . .	2 drachms
Prepared Chalk	1 scruple
Laudanum	20 drops

Mixed, and given in half a pint of warm oatmeal-gruel.

No. 8.

Spring water	1½ pint
White Vitriol	1 scruple

Mixed, and the eyes to be bathed with it twice a-day.

No. 9.

Peruvian Bark and Powdered Ginger, of each	1 drachm
Compound Tincture of Camphor . .	1 „

Mixed in half a pint of warm gruel, and sweetened with sugar or treacle.

No. 10.

Soap and Opium Liniment	1 ounce
Linseed Oil	1 „

To be shaken together when used.

No. 11.

Mercurial Ointment	3 ounces
Camphor, well rubbed down with Spirit of Wine	2 ounces
Hogs'-Lard	¼ lb.

The ingredients to be carefully incorporated, and to be well rubbed in twice a-day.

No. 12.

Goulard and Spermaceti Ointment, of each	1 ounce
Alum, finely powdered	2 scruples

To be mixed for use.

No. 13.

Compound Camphor Liniment	1 ounce
Laudanum	3 drachms

To be mixed for use.

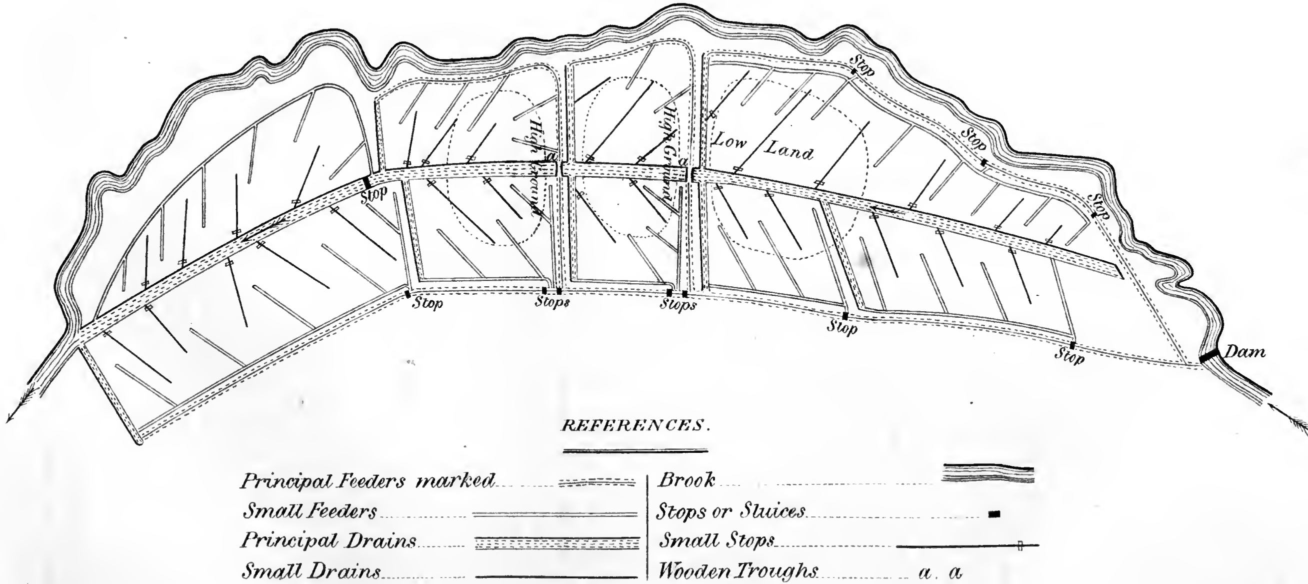
XXXV.—*Practical Statement of the Formation of an Economical Water-Meadow.* By William Paxton, Esq.

To the Secretary of the English Agricultural Society.

Sir,

Being in the occupation of a meadow, containing 20a. 2r., situate in the parish of Bicester, in the county of Oxford, which, from time immemorial, had been subject at certain seasons of the year to floods (causing the land to produce flags and all sorts of aquatic plants, to so great an extent that some parts of the produce were of little greater value than to lay into the yard to make dung), I was determined, in the autumn of 1838, from the confidence I had in my landlord (being only a tenant-at-will), to try, at my own expence, the effect of irrigation on the said meadow.

My first object was to ascertain, as near as I could, the probable expense of carrying my views into execution; this done, my next step was to satisfy myself of procuring a proper supply of water, and its quality. This also, on trial, proved satisfactory, it being the produce of a spring oozing out of limestone rock and marl strata, distant from the spot about two miles, which was brought to the meadow by the brook adjoining, as seen on the plan. Having succeeded so far, my next step was to throw a dam across the brook, and to do it in such a manner that it would not cause my neighbour's land on the other side to be inundated; therefore I made a sort of moveable dam or sluice, which I can put up and down at will, so as to regulate the water sufficiently for my purpose without doing injury to the opposite lands. My next object was to make myself sure that I could get the water off as quick as I could get it on; in this I was a little puzzled, as the middle part of the meadow was the lowest, being nearly as low as the bottom of the brook. This caused some consideration and trouble: however, a thought struck me that I would carry the main drain through the whole length of the mead, and dig it deep enough over the rising ground, which I did, and again succeeded to my entire satisfaction, as on this depended the completion of my enterprise. I next turned the water out of the brook over the whole twenty acres, in order to ascertain the levels, which I did by sticking down pegs and laying bits of turf in the hollow places level with the top of the water. I then let the water off by the main drain, which was already dug for that purpose; this enabled me to carry the water by small floats to the high parts, and to make all the small drains in the low parts, which made it something like running from ridge to furrow. I used no spirit level, but proved the levels with the water. Be pleased to observe that when I let the water on the land, all that part of the brook below the dam was empty, which then became the prin-



Standidge & Co. Litho. London.

cipal receiver for all the drains in the meadow. The accompanying plan will show the form of the meadow, and point out all the various conductors, feeders, and floats, with the main drains and small drains for letting the water on and off. During the time the work was in hand I attended my labourers four or five hours each day, or as much time as I could spare; which I am convinced tended much to lessen the cost, as my object was to execute the work in the cheapest and most simple manner.

I gave for digging all the main conductors and large drains 4*d.* per rod; for the medium drains 2*d.*; and for the small floats and drains 1*d.* per rod: the whole cost of this was 27*l.* 10*s.*; 10*l.* the sluices, and 5*l.* making the dam across the brook; making the whole cost 42*l.* 10*s.*

In the beginning of the present year I began to float the meadow, and had not applied the water long to the land before I observed an evident improvement. I wish also to state that, on some of the worst parts of the meadow, where the flag-roots and aquatic plants were so blended with the soil, I dug the whole and laid the top downwards. I did not lay the spits too close together, but left sufficient room between each for the grass to shoot up; and, to my great surprise, the whole of the flags and aquatic plants disappeared, and an entire fresh herbage of good quality sprung up in their stead. If there were any difference in the crop, I think this spot had the advantage; the whole however produced the best crop I have ever seen, and which was cut in June last, and yielded more than 2 tons per acre, which was of double the value of any crop which I have had from any part of the said meadow, in any season, these last 20 years. As soon as the grass was mowed and the hay cleared off, I let on the water again; and, in about 5 weeks, there was another crop fit for the scythe; but, having had enough hay-making in such a wet and trying season, I was afraid to encounter the second crop for hay; consequently, I turned in my cattle, consisting of horses, cows, and sheep, all of which appeared to do well: but when the working horses were taken up again to their work, they each and all were seized with a relaxation to such a degree that I was fearful some of them would die. This leads me to doubt whether the hay* or grass produced from water-meadows is proper food for working

* The Duke of Richmond, having applied to the Duke of Portland for his Grace's opinion on the effects of water-meadow hay as food for horses, has received the following communication:—

"There is reason to believe that water-meadow hay is not good for horses working on wind; but, for all other purposes, it is quite good. On account of its succulency, the grass is difficult to be made into hay, and requires much time.—Horses of every description, and cattle, thrive greatly on the meadows themselves; and I should say that, unless they give the rot

horses, though it answers well for milking cows and, in the spring of the year, for sheep,—say, until June, but no longer. The mode I adopted in putting on the water was to float about one-half of the meadow at one time, letting the water on about 3 days and nights, and allowing it the same time to drain off, and so on alternately until the beginning of May, when I ceased.

The fall of the water from the highest part (near the dam) in the brook to the point where the main drain empties itself again into the brook is, as near as I can ascertain, 22 inches.

I am, Sir, yours truly,
WILLIAM PAXTON.

Langford Farm, Bicester, Oxon.
Sept. 16*th*, 1839.

XXXVI.—*On Argyleshire Cattle.*—By E. F. WELLES, Esq.

To the Editor of the Journal of the English Agricultural Society.

SIR,

SOME years ago I published a letter in the 'British Farmers' Magazine,' giving an account of the transplantation of a small herd of Argyleshire cattle into the fertile pastures of Herefordshire, and threw out some suggestions as to the probable results. From the time that has since elapsed (I believe as much as 15 years), I am, from being in the habit of seeing and making observations on them, enabled to speak with more accuracy and certainty as to the effects which have actually taken place, which are perhaps less material than might have been imagined, after such a lapse of time. I believe this to be the only attempt at the introduction of a breeding-stock of this sort into the county. They are in the hands of Edward Poole, Esq., a gentleman who, from his connexions in the north, where he has estates, was enabled to procure some of the best blood, principally from the well-known stocks of Lord Strathmore and the Duke of Argyle.

After he had bred from them for a few years, I took a journey myself into Northumberland, and purchased half a dozen cows

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to sheep, they are the most wholesome pasture for them, as well as for horses and cattle: but my meadows are all apparently perfectly dry.

" *Welbeck, Jan.* 5, 1840. SCOTT-PORTLAND."

There is a general impression amongst owners of horses that hay grown on low and moist meadows is not so good for working horses as upland hay: but the hay which is usually called lowland hay is not produced on water-meadow with porous subsoils, or well underdrained, as all good water-meadows should be. The hay produced on such water-meadows is of a much better quality and more nutritious, and may probably be very fit for working horses.—W. L. RHAM.

and heifers of Mr. John Bates, of Hedden, near Newcastle, a gentleman who had bred them, with great care and judgment, for as much as 25 years, deriving his blood from the most eminent breeders in Argyleshire and the Isle of Skye. They bore a somewhat different character to those Mr. Poole had previously obtained, chiefly in the length and gay appearance of the horns. These had been bred and kept exclusively upon moor land of very inferior quality. The colours of those previously procured consisted of light and dark dun, cream colour, red, and black. A portion of this new blood from Mr. Bates was infused into the former stock of Mr. Poole; and with that intermixture alone the present stock has been raised. The herd is not a large one, perhaps consisting of 12 or 14 cows; and one of the most important benefits accruing from them has been, that, from his practice of thick and hard stocking, he has been enabled to increase his number considerably on the same quantity of land: and it may be observed, that they graze the pastures as equally, and almost as close, as sheep.

This gentleman accustoms all the best milkers to the pail, and finds, with gentle usage, they are mostly tractable, and give a fair quantity of milk, of a quality little inferior to the Alderney. Their form has been generally improving, from care in the selection of the bulls; but as it often happens that many of the best-shaped heifers have turned out inferior milkers, and as the milking quality has been held to be indispensable, the general adoption of the truest form has been much retarded. They have in general been exceedingly healthy, and have been subject to few diseases or accidents. There has been no great increase of size, and but little variation in the coat. Some individuals, at their first introduction, varied from others considerably in their quality, and so they continue to do; and those which possessed a profusion of mossy or curly hair are relatively, as to their family, the same at the present time. I think an increase of size is more observable in the bullocks that are bred from them. I have known a pair of these fetch in Hereford fair the same price that was obtained for a pair of moderately good Herefords; having been reared and kept alike. The quality of their flesh generally leaves nothing to be desired; and their aptitude to feed is surpassed by none. Having been constantly under habits of domestication, they retain little of the wild and suspicious looks usual with them at their first introduction on the sudden approach of strangers. I confess I felt anxious to see some crosses made with the Herefords—not without the anticipation of its being beneficial—but it did not even in the first cross (which is generally the best), succeed s well as I have observed it in other breeds; and, although the Hereford is in general of a dark red, the produce from the cross

was almost invariably of a lighter colour; and when the cross was carried on with the Hereford blood too, the animals so bred had rather deteriorated than improved: there was, too generally, much more waywardness of temper.

Within these few years an accidental variety has arisen. One of the cows, having a small portion of white, produced a spotted calf; and this being a bull, the proprietor was induced to keep him as such; from which, if equally good in other qualities, he might add to the beauty of his stock, as the tenants of a richly-wooded domain. That object has for several years been successfully carried on, and without any deterioration of any important essential. The mixtures that have already taken place are chiefly confined to the light duns and cream colour, and a most pleasing variety they exhibit; the arrangement of the spots being curiously diversified and delicately broken and subdued by the continually shifting masses of hair.

Though Hereford is almost exclusively a breeding county, few persons give themselves the trouble of riding a little distance to view such a stock; and, though it may not be their interest to adopt it, yet, possessing so many qualities to please the most discerning breeders, it creates some surprise no more notice has been taken of it. Some few landed proprietors in Monmouthshire and the Welsh border have been in possession of some of the breed of Highland Scots for many years; but, as I have had no opportunity of examining them, or inquiring about them in that locality, I abstain from any vague or unwarranted statement. I cannot, however, avoid expressing my surprise that the experiment of placing them in different parts of the principality has not been more attended to; it being very desirable that the question should be determined, whether any physical causes exist inimical to their well-doing.

I am, Sir, yours, &c.

E. F. Welles.

Hereford, Nov. 20, 1839.

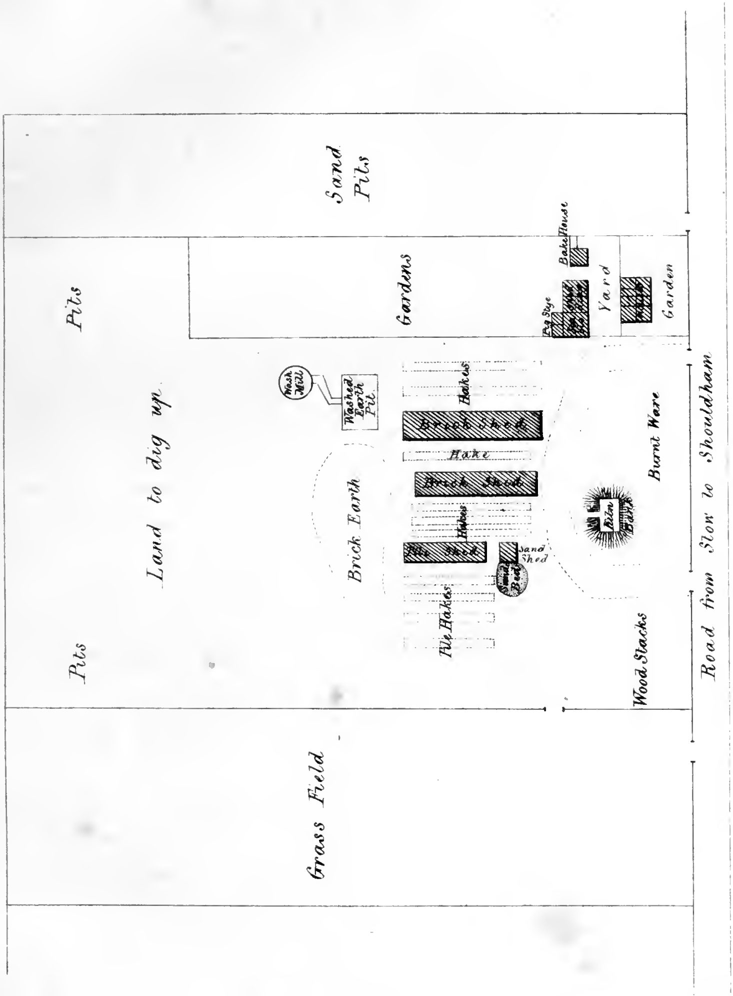
XXXVII.—*On the Mode of Making and Using Tiles for Under-Draining, practised on the Stow Hall Estate in Norfolk, &c.* By John Wiggins, F.G.S., Land-Agent. *

1. The proper earth for making draining or sough tiles is a strong or stiff clay, whilst bricks require a mild or more tender clay. The tile-earth here is a strong blue clay of the Kimmeridge

* Many modes of making drain-tiles are at present practised; and the Yester patent (founded on the Marquess of Tweeddale's invention) and se-

FODDESTONE BRICK YARD.

Stow Hall Estate.



PLAN, No. 1.

Standidge & Co. Litho, London

clay (oolitic) formation, and some veins of it, being slightly calcareous, chalk marle being near, burn white-ware.

2. The earth is begun to be raised from the pit in November, and this process is continued till February, during which it receives the wet and frost of winter which meliorates it much.

3. About the middle of February the heap is covered with sand, if the earth be too strong, in a quantity proportioned to the reduction of strength required; but, whether sanded or not, it is turned over and watered during the turning. This process is twice gone through, and is finished early in April.

4. The moulding or making commences about the beginning of April, and continues till the middle of October; the earth for common ware is turned once over, and for better ware twice or thrice, before being put into the mould, but for superior ware (called hollow ware or odd ware), such as copings, white or straw-coloured bricks for house-fronting, pavements for house-floors, &c., it should be either ground in a tub-mill (also called a pug-mill), or washed in the mill shown at E, in the Plan No. 3.

5. The relative situations of the kiln and the kilnman's house and offices, with his ground for digging, &c. An excellent arrangement of the whole is shown in the Plan No. 1.

Plan No. 2 shows the position and dimensions of the kiln, sheds, and hakes.

Plan No. 3 shows the ground plan and sections of—

1. The kiln, ground plan 16 by 12 feet clear, A.
   Section B, 12 feet high.
   Section of front arches for burning with coals, C.
   Implements used in burning, D.
2. Ground plan of wash-pit for fine ware, E, the grate opening in a large shallow pit, where the washed earth lies to dry for several months: see Plan 1.
3. Shed for Bricks to dry in (Section) F.
   17 feet wide, $3\frac{1}{2}$ high to eaves, 10 to ridge.
4. Shed for Tiles (Section) G.
   14 feet wide, 7 high to eaves, 11 feet to ridge.

Plan No. 4. Moulds, &c., for Tiles.

(*a*) Mould for large drain-tiles, $13\frac{1}{2}$ in. by $11\frac{1}{4}$ in., worked on a stock (fixed block) on which it fits.
(*b*) Form of bender (profile).
(*c*) Section of bender lengthways.
(*d*) Mould for small tile, $13\frac{1}{2}$ in. by $7\frac{1}{2}$ in.

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veral other patents have been recently taken out for supposed improvements in this new branch of agricultural manufacture: the individual merits of these different modes, however, will only be ascertained by comparison and experience.

(*e*) Section of small tile on bender, and horse or rest for it.

N.B. The ends of the moulds must be slightly scooped inwards to allow for the flat being bended into the arched form.

(*f*) Mould for large tunnel-tiles for gateways, &c., 18 in. by $15\frac{1}{2}$.
(*g*) Ditto on bender.
(*h*) Small tunnel-tile mould, 15 in. by $14\frac{3}{4}$.
(*i*) Same on bender.
(*k*) Mould for the bottom tiles, 11 in. by $5\frac{1}{2}$.
(*l*) Pallet of bottom tiles.

6. The kiln is of brick, first 4 bricks thick, then 3 bricks, then 2 bricks, banded round the top with iron straps, and embanked outside. This kiln holds about 50,000 small tiles and bottoms, about 30,000 large with bottoms, or about 28,000 bricks only, but about 5000 bricks are found necessary to burn the tiles well, 2 bricks occupying the place of 3 tiles. The sheds are built of oak posts, set in the ground with fir-pole plates and rafters pantiled. The kiln takes 52,000 bricks to build, of which 7000 are fire bricks for the arches, the rest common bricks; these are burnt in a clamp for that purpose, on the spot, at 20*s*. per 1000. The bricklayer's, the iron and other work in building it was 00*l*. There are 80 yards in length of shedding for bricks, costing in labour and nails to build 4*s*. 6*d*. per yard, and 40 yards in length of tile shedding, costing in labour to build 4*s*. per yard, and 40 yards of shelves, costing 2*s*. 4*d*. per yard; also 73 squares of roofing, taking 11,700 pantiles to cover, and 400 ridge-tiles. The cost of the whole establishment, exclusive of house and offices, which pay rent, is estimated at 235*l*., without timber, which is the produce of the estate, but this might have been sold for about 100*l*., and these buildings are sufficient to burn off 300,000 ware of all sorts, though requisite for half that number.

7. In the process of making the tiles the moulder fills and strikes the mould, takes it off the stock, and lays it on the bender; an attendant boy presses it to the bender, dips his hands in water and washes and smooths the tile, then carries it on the bender, and places it on the shelves shown in Section G, Plan 3, where it dries by a thorough draft, which draft is regulated by moveable reed skreens; when dry enough to move without damage they are placed one upon another on the *hakes* or piles in the sheds till placed in the kiln; the bottom tiles are transferred from the mould to a pallet-board piled 10 to 15 tiles high (*l*), Plan 4, and placed on hakes till hard enough to move; they are then separated into handfuls of 5 each, and chequered, *i. e.* placed so as to have air circulate till ready to be burned.

8. In setting the kiln it is requisite to place the ware as shown in B, Plan 3, viz., first several tiers of bricks, then draining tiles

and bricks alternating, then bricks and bottom tiles alternating. The tiles are placed thus on their ends , the bottoms in row in fives thus /////, and the next row thus \\\\\, the bricks thus . The large tiles burn to $12\frac{1}{2}$ inches long, 5 inches high, and $3\frac{1}{2}$ inches opening; the small tiles to 12 inches long, $3\frac{1}{4}$ inches high, and $2\frac{1}{2}$ inches opening; the bottom tiles to $10\frac{1}{2}$ by 5 inches, and three-quarters of an inch thick. The large tunnel-tiles when burnt are $12\frac{1}{2}$ inches long, 7 inches high, and $9\frac{1}{2}$ inches opening; the small, 11 inches long, 6 inches high, and 8 inches opening.

9. Both wood and coal are burned in the kiln, the latter requiring iron bars along the arches and doors, as shown in C, Plan 3. This kiln takes about 2000 fir-top fagots to burn off, or 1500 of better wood, viz., 1000 fagots, and 2 waggon-loads of round wood; when burnt with coals it takes about 200 fagots, or peat-turf, in proportion at first, and afterwards about 6 tons of coals. The labour of burning is greater with wood than coal, and worth 1*s*. 6*d*. to 2*s*. per 1000 more.

10. The kilnman finds everything but buildings, earth, and straw, fuel and duty (on bricks), and is paid 26*s*. per 1000 for the large tiles, 15*s*. per 1000 for the small tiles, and 9*s*. 6*d*. per 1000 for the bottom tiles. He has also 12*s*. per 1000 for bricks, and he pays a rent for the house and land. The detail of value of labour in the various processes is thus stated :—

1.—BRICKS per 1000.

		s.	*d.*
1	Raising the earth	1	6
2	Turning and watering	0	10
3	Moulding and haking	4	0
4	Barrowing to kiln and out	1	4
5	Setting	0	4
6	Burning	2	0
7	Sand raising and carting	0	6
8	Tools, waste, & foreman's profit	1	6
	Paid kilnman	12	0
9	Duty	5	10
10	Fuel	6	0
11	Straw, &c.	1	0
12	Grinding, extra	2	0
	Cost	26	10
	Value of bricks to sell	35	0
	Groundage for earth, agency, sand, &c.	8	2

2.—LARGE DRAINING TILES per 1000.

		s.	*d.*
1	Raising earth	1	6
2	Turning, &c.	1	6
3	Moulding and drying	12	0
4	Barrowing to kiln and out	1	4
5	Setting	0	4
6	Burning	2	0
7	Sand and carting	0	6
8	Tools, waste, & foreman's profit	6	10
	Paid kilnman	26	0
9	Fuel	6	0
10	Straw	1	0
	Cost	33	0
	Value of tiles to sell	45	0
	Groundage for earth, agency, sand, &c.	12	0

3.—SMALL DRAINING TILES per 1000.

		s.	d.
1	Raising earth	1	0
2	Turning, &c., four times, or grinding	1	0
3	Making, i. e. moulding and drying	6	6
4	Barrowing to kiln and out	1	4
5	Setting	0	3
6	Burning	1	3
7	Sand	0	6
8	Tools, waste, & foreman's profit	3	2
	Paid kilnman	15	0
9	Fuel	4	0
10	Straw	0	6
	Cost	19	6
	Value to sell	25	0
	Earth, sand, agency, &c.	5	6

4.—BOTTOM TILES per 1000.

		s.	d.
1	Raising	0	6
2	Turning, &c.	0	8
3	Making, &c.	3	6
4	Barrowing to kiln	1	0
5	Setting	0	3
6	Burning	0	9
7	Sand	0	6
8	Tools, waste, & foreman's profit	2	4
	Paid kilnman	9	6
9	Fuel	3	0
10	Straw	0	6
	Cost	13	0
	Value to sell	15	0
	Earth, sand, agency, &c.	2	0

5.—LARGE TUNNEL TILES per 1000.

		s.	d.
1	Raising	7	0
2	Turning and grinding	3	0
3	Making	50	0
4	Barrowing to kiln and out	5	0
5	Setting	1	6
6	Burning	6	6
7	Sand	2	0
8	Tools, waste, &c., foreman	20	0
	Paid kilnman	95	0
9	Fuel	20	0
10	Straw, &c.	5	0
	Cost	120	0

6.—SMALL TUNNEL TILES per 1000.

		s.	d.
1	Raising	4	6
2	Turning, &c.	2	0
3	Making	25	0
4	Barrowing in and out	3	0
5	Setting	1	0
6	Burning	4	6
7	Sand	1	6
8	Tools, waste, &c., foreman	43	6
	Paid kilnman	85	0
9	Fuel	13	0
10	Straw	2	0
	Cost	100	0

N.B.—Of these tunnel-tiles 1000 of each per annum will suffice a considerable quantity of land: and washing in the mill E, Plan 3, is worth 10*s.* per 1000, and is only practised for particular ware.

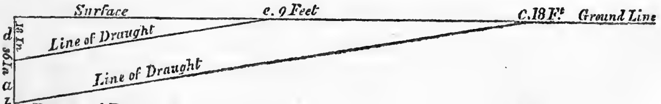
N.B.—About the year 1817, when extensive tile-draining commenced on the Stow Hall estate, the then Brick and Tile Act only authorised flat tiles to be made *free of duty* for draining of certain form and perforations, such as were supposed to render them unfit for other purposes; but the forms and perforations and dimensions prescribed by the Act rendered the tiles unfit for the purpose of draining. This defect in the law was afterwards amended.

11. The consumption of wood, from the thinnings of the fir and other plantations, is found very convenient, as it would otherwise be scarcely saleable in great quantities. On the other hand, the carriage of wood to the kiln is a great expence. The kiln is therefore to be placed as near to the plantations as possible: the

proper earth is often incident to woodland soils, and it may sometimes be worth while to plant around the kiln for future fuel.

12. After many years' experience, trials of many plans, forms, and sizes, and the use of millions of tiles, the forms and dimensions above given have been settled upon as the best, most effectual, and cheapest; and the prices are found to be such as just to enable steady industrious men to get a rather better living than by common labour, ordinary wages being 12*s.* per week; but it is evident that a certain quantity must be made to pay a foreman or kilnman: say, 200,000 of all sorts of ware. No holes in the tiles are required, because, in the process of draining, the water falls to the sides of the tile, and gets under its edge to the flat or bottom tile: the lowest drop of water is first let off by the aperture; this makes way for (and attracts) another drop, and so on to the top. The larger tiles are always sought for by farmers, if young drainers; but they are only requisite in case of main drains which have a great length of other drains to carry off the water at headlands, &c. The small tiles answer all ordinary purposes.

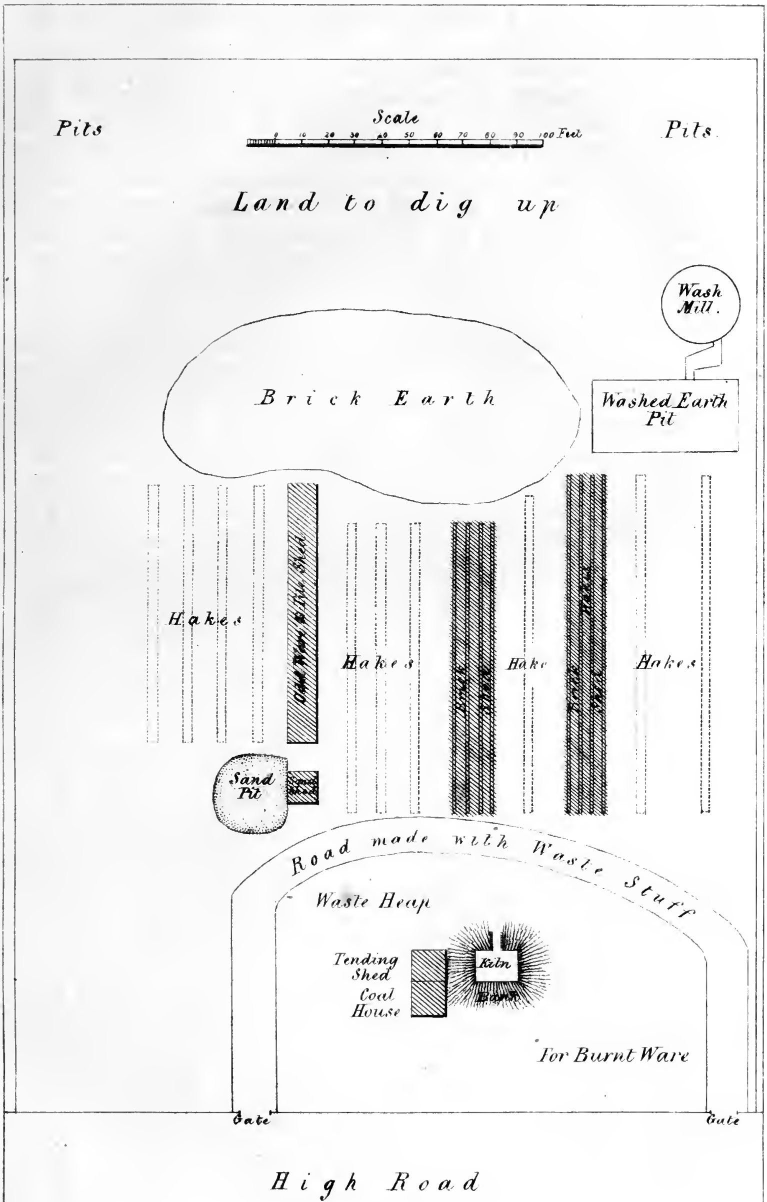
13. Lands in some counties are ploughed up high into broad ridges (an ancient method of drainage), the tile-drains are then placed in the furrows, and the height of the "lands" or ridges reduced by ploughing down gradually. In such cases there is a very general fear of placing the tiles too deep; and the consequence is, that they are often placed so shallow as to be filled by moles or roots, or displaced by tread of horses or cattle in wet times. In furrow-draining stiff lands, the tiles should ultimately lie 30 inches deep, after the lands or ridges have been ploughed down, but not less than 24 inches at first; and in looser and more open soils, 30 inches at first, and 36 inches at last, *i. e.*, when the ridges are thrown down, are the proper depths on the average, but more in some places, and the nearer they approximate to these depths the more effectual will be the drain; since the drain not only acts from the bottom to the top, as already mentioned in 12, but because water in descending seeks the nearest vacuity: the attraction of the escaping drop downwards is in a diagonal line from the bottom of the drain to the top of the land; thus, in the following diagram, suppose the influence of a deep drain, say 36 inches (*a*), to be in the line *bc*, as far as the point *c*, say 18 feet of surface; now the shallow drain (*d*), say 18 inches deep, can only have an influence in a diagonal line parallel to *bc* to the point *e*, which will be 9 feet of surface.



Yet both these drains require an equal number of tiles. The error of shallow draining arises from an anxiety to see no water stand on the surface: but the object of draining is not to take off the water as fast as it comes down, but so fast as to prevent injury to vegetation. It must, however, be confessed that shallow draining often arises from inefficient ditches, even where the fall is ample. If there is any apprehension of the water not going off in time to prevent mischief, the farmer should put a few loose stones over the tile before filling in, and fill in with the loose more friable top soil.

14. Inexperienced drainers with tile often deem the flat or bottom tile superfluous; but there is no security for permanence but in the flat continuous pavement, with an uniform and not too quick descent: it must lie so firm on the soil that the drainer may walk backwards on it from the lower part of the drain upwards, carefully placing the arched tiles on the bottom tiles, so as the jointings of each come to the middle of the others; and seeing that the water flows away as he goes on. Accuracy, and even nicety, in laying tiles is essential to their success.

London, July, 1839.



PLAN. N°II.

Standidge & C° Litho London.

XXXVIII.—*Practical Experience in the use of Biddell's Scarifier.*—By Mr. Henry Case, Secretary of the South Norfolk and North Suffolk Agricultural Association.

Biddell's Scarifier.

To the Secretary of the English Agricultural Society.

Sir,

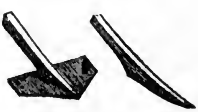
My engagements beyond my common vocation have prevented an earlier reply to your inquiries of October the 19th, respecting the use of "Biddell's Scarifier," and my own application of it, which implement I have used for the last four years in the cultivation of my farm.*

There is such a variety of circumstances which occasion the scarifier to be used, and which determine the different horse-power to be applied on each occasion, that my own method of using it, on strong hilly land (frequently with four horses), will form no criterion for the guidance of a farmer differently circumstanced.

* A description of this instrument has already been given in the Report on the Implements exhibited at the Oxford Meeting (Journal, Part II., Appendix, p. lxv.)

By the use of this implement I can equally well cultivate my farm with 12 per cent. less of horses than I could cultivate the same land without it. The land intended for fallow I plough up deeply, and as early in October or November as I can; it then lies until the dry weather in March or April, when I scarify it as deep as it has been ploughed, generally three times in a place, each time followed by harrowing and rolling: it will then, in most instances, be found clean and ready for ploughing overwart (or across), but, if not sufficiently cultivated, is then scarified again.

The previous year's fallows to be followed by spring corn, on my farm, are generally scarified with four horses, two in each furrow, at length; but on lands of less tenacity than mine this scarifier is used with three horses, only two in one furrow, on that side of the stetch where the implement covers half, and one horse in the opposite furrow; in this case, a long steelyard whippletree is indispensable, and I am informed that an admirably-constructed caster-wheel is made by Messrs. Ransome, which, if affixed at the long end of the whippletree, makes it go remarkably well for the single horse.



In cleaning my pea and bean-stubbles I first use my chisel-points, and, if the land be very hard, go twice over with them, and, if necessary, then take off the points, and affix the broad blades,which cut the land clean.

At your request I have given this description of some of the uses of "Biddell's Scarifier," but the practical farmer will vary the uses according to his skill and circumstances, and will require no further directions than those contained in the printed circular.

In using this implement I have found it necessary to caution my men against suffering the horses to turn at the ends of the work, without raising the tines from the ground, which is easily performed by means of the *lever;* and, unless they pay particular attention to this, some part of the implement would be likely to be broken.

In handing you these particulars I have only aimed at simply giving you the information you requested, and as resulting from the practical use of the scarifier on my own farm; and shall be happy if I have expressed myself in such a way as may convey the intelligence you wish.

I have the honour to remain, Sir,

Your obedient Servant,

HENRY CASE.

Thorndon, near Eye, Suffolk, Nov. 1, 1839.

XXXIX.—*On the Duke of Portland's Water-Meadows at Clipstone Park.*—By John Evelyn Denison, Esq.

The Clipstone water-meadows lie between the towns of Mansfield and Ollerton, in the county of Nottingham, in the heart of Sherwood Forest, a wild and barren district. Out of this waste they have been created, and by it they are still surrounded, at least beyond the line of cultivation, which their own influence has produced.

A broad turf drive, seven miles in length, connects Clipstone with Welbeck: the last two miles of which, forming the immediate approach to the meadows, lead through the old oaks and birches of Birkland, the most beautiful part of Sherwood Forest, and the only part which has preserved its woodland character undisturbed from the days of Robin Hood.

The contrast between the wild beauties of nature and the finished works of cultivation and art, thus placed side by side, is very striking and remarkable.

The eye, after wandering through the glades of the forest, and resting on the brown carpeting of fern and heather with which it is clothed, is amazed on coming suddenly in view of the rich green of the meadows, extended for miles before it, laid in gentle slopes and artificial terraces, and preserved in perpetual verdure by supplies of water continually thrown over their surface.

The land immediately occupied by these meadows was in its wild state a line of hill-sides, covered with gorse and heather, —a rabbit-warren, over which a few sheep wandered,—and a swampy valley below, thick set with hassocks and rushes, the favourite haunt of wild ducks and snipes; through which the little stream, the Maun, wound its way in its descent from the town of Mansfield.

The whole track, both upland and lowland, was of very little value. The valley was in many parts from 9 to 10 feet deep in bog, and almost worthless; the hill-sides varied in quality: but 80*l*. a-year would have been a full rent for the 300 acres. Indeed, the whole of the Clipstone Park farm, when taken in hand in the year 1816, containing 1487 acres, had been let for the sum of 346*l*.

In the year 1819 it occurred to the Duke of Portland that by following the stream up towards its source, and tapping it at a high level, the water might be carried over the surface of the dry and steril hills, its course through the valley might be straightened, and the bog drained. The levels were taken, the practicability of the measure ascertained, and the works, which have grown to their present vast dimensions, and which have produced such

striking results, were undertaken under the direction of the late Mr. Tebbett.

To give the reader a more distinct conception of the ground, the accompanying plan has been prepared, by which it will be seen that, at the point A the flood-dike draws the water from the river, and its course may be followed, bending with the irregularities of the ground, and showing how it distributes the water over the land to the point B, where it returns it to the river below. The difference of the level between the flood-dike and river being at this extreme point 58 feet 8 inches.

The want of water, and the unfavourable lay of the ground, would not permit the further extension of the works in this direction; and it will be seen that, where they are continued beyond, they have been carried on the opposite side of the river, the levels having again admitted that the stream should be poured into a fresh flood-dike. In this way the water is compelled to do double service, and every drop is carried to a valuable account.* An excellent road has been made along the entire length of the flood-dike, commanding a view of the whole works, at all times in good order, as the water for flooding is conveyed in sluices under the road. The length of the first flood-dike is 5½ miles; of the second about 2 miles. The number of acres watered is about 300.

The section of the first damside breck meadow on the plan will show the inclination of the slopes, and how the water is received from one carrier to another in its descent to the river. These carriers down the slopes are pitched with strong limestone, and grouted with lime and water. The flood-gates are all well built, with ashlar piers for stops. Deal is used for the small carriers, as it does not warp with the sun. It is necessary to stone any descent of a greater fall than 1 inch in 5 yards: strong land might bear a greater fall. A plan of the valves and shuttles in use is also given.

The meadows were formed (as has been said above) out of land in two different and most opposite states—the dry hill-side and the swampy valley. Each required its peculiar care, and mode of preparation. Far the most difficult and most expensive was the drainage of the swamp; and the great body of experience which has been obtained in accomplishing this object would of itself afford a most valuable chapter of instruction to any one about to enter on a similar undertaking. The process pursued on the hill-sides, the soil of which is a poor sand, was first to stub

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* This lower end of the meadows is not inferior to the upper districts, which first receive the water. They are naturally better land, which sufficiently accounts for it.

the gorse, and to pare and burn the heather. The ground was then ploughed and fallowed for turnips. The turnips were eaten off by sheep; and the first process of rough levelling was then done by the spade. To lay the land in its present form of even and gradual slopes, much labour and care were necessary: hillocks were cut away, to the depth of 5 and 7 feet, by the spade, and carried in barrows to supply adjoining deficiencies. Then followed a crop of barley, and a second crop of turnips; after which the final and perfect levelling was completed.

But when the water was first thrown over the ground, new and unforeseen difficulties had to be provided against. The water found its way into the old rabbit-holes, and burst out in springs. All such unsound spots had to be dug out and rammed into firm ground. The slopes, too, were found in some places to be too steep; in some, too nearly flat. The result of long experience seems to show that the best inclination is a fall of 10 feet in 90. Where the land is laid in this slope the grass is observed always to be the most forward, and to grow the greatest bulk. Very flat parts will not answer, though tried in valleys near the river, where the land is naturally of the best quality. The water does not get over quick enough, and the land is consequently starved.

In moving earth, too great pains cannot be taken to preserve the good soil on the top. Though great attention and great expence were bestowed on this point, and nothing was moved but ground a foot below the surface, still the land has always suffered from the operation; and, even now, after many years' irrigation, the spots which have been so lowered may, in many parts, be distinguished.

After the second crop of turnips, and in some cases after a third, and the perfect levelling, the land was sown down in the month of April with hay-seeds, collected from the Derbyshire meadows; 3 qrs. of hay-seeds, 10 lbs. of white clover, and 3 lbs. of rib-grass, to the acre.* As soon as the seeds were strong enough to bear watering (and this varies with their growth from one month to six, according to the weather) the water was turned over them. The water was kept going over for about four days, and then taken off. The seeds were mown as soon they were

* The following note has been communicated by his Grace the Duke of Portland:—"It depends entirely on the strength of the seeds how soon they will bear watering, without having the soil washed away from their roots: short of that they cannot be watered too soon, or too long at a time, unless indeed the land has very recently been drained; in which case it would not be advisable to increase the natural strength of the springs, until the land had forgotten its wet propensities. On real dry land there are only two limits to the length of irrigation; viz., the want of water, and the want of consistency in the soil, so that it shall not be washed away from the roots of the grass."

ready, and the water again turned over. The same process is observed with the established turf. The water is turned on for three or four days at a time, at the interval of about a month or six weeks, according to the supply, and this throughout the year, through the heats of summer and the snows of winter. When the supply is abundant in the winter, spring, and autumn, it is sometimes turned on in succession more frequently than once a-month. The time of keeping on the water cannot, however, be determined by any strict rule; so much depends on the state of the atmosphere and the condition of the ground. Mr. R. Tebbett, the son of the original engineer, and the present skilful manager of the works, likes to keep the water on till he can perceive that it has produced an effect, and then to turn it off.

The quality of the water is very important: soft water the best; mineral waters and waters from peat-mosses and bogs are found to be injurious. After strong rains the washings of the streets and sewers of the town of Mansfield, which discharge themselves into the Maun, give great additional efficacy to the water. Mr. Tebbett compares its virtues in that state to ale; when, in its ordinary condition, it would not deserve a better name than that of small beer. It will sometimes deposit a sediment in one watering of the thickness of a sheet of paper.

In the management of the crops of grass, experience has shown that to let the grass grow to be too old—viz., until the seed of it is in a forward state—is productive of very great injury to the land. When the grass has been cut for hay in this state, and brown at bottom, the land does not recover for a great length of time. It is also found very desirable, after beginning any meadow, or portion of a meadow, which receives the water from one carrier, and at one time, that the consumption of it in a green state should be carried on as quickly as possible, so that in dry weather the water may not be kept off too long, for in that case it requires so much water before the land is saturated, and will allow the water to flow evenly over it, that much loss of time occurs in the next crop of grass.

The supply of water has not been hitherto sufficient to control the effect of the seasons; indeed there is great difficulty in adjusting the quantity of stock to the land. In dry summers, when the river is low, the want of water is most sensibly felt. In wet seasons the meadows perhaps outgrow the possible consumption of the stock, and it then becomes necessary to mow a much greater breadth for hay. But the same wet weather which has caused the abundance often destroys the hay; as, from its great succulency, it is necessary to leave it out longer than ordinary meadow-hay, or even clover. The inconveniences which have been felt from a want of water and long droughts will be, in a great degree, if not

entirely, remedied by the construction of a large reservoir of 70 acres, which has been recently formed by the Duke of Portland, above the town of Mansfield, which will secure the means of working the mills in that town, and of irrigating the meadows in dry seasons.

It has been said, that the difficulties of draining the boggy valley far exceeded the labour on the hill-sides; neither, in any case, has the result been so completely satisfactory. The greatest effects of water are shown on the driest hill-sides. The draining was done, with great skill and judgment, by the late Mr. Tebbett, who seemed to have a sort of instinctive science in these matters: and if the land had not been intended for irrigation, the cure would have been complete; but the irrigation increased the strength of the springs so much, that in many cases the draining has had to be done twice over. In addition to this, the inconvenience has been felt of the land subsiding with the draining of the water; in consequence of which, the levels of the low lands, after having been irrigated, and having been very productive for some years, have become deranged, and it has been necessary to break up the meadows in order to give them the regular fall necessary for the beneficial application of the water.

A long course of experiments has demonstrated the necessity of effecting a complete and perfect drainage of the bottom water, and has shown, too, no less clearly, the great difficulty that attends this operation; the noxious effects of bottom water showing themselves at a depth and under circumstances which could hardly be credited by any but those who have actually witnessed them. It is not uncommonly held by persons conversant with draining, that if the land is well filled with shallow drains, so that no top water can lodge, and that all bottom water, which should rise to the level of these drains, should also be carried off, that all that is necessary has been done. But if instead of shallow drains at 20 inches, the case should be put of land well filled with drains at 5 feet deep, it would be doubted by few that such land would certainly be secured from all the bad effects of bottom water. But this is by no means the case, as the following instances will show.

An old meadow at Welbeck on the side of a hill, opposite to the dog-kennels, very wet and unsound, was filled with tile drains 5 feet deep. Though much improved by these drains, it still remained wet, to the surprise and mortification of those who had done the work. Some years afterwards Mr. Tebbett was called in to effect a more complete cure, and carried a deep drain into the hill side, and cut off the spring water nearer its source. The 5-feet drains stopped running, and the meadow became perfectly sound. But though perfectly sound as a meadow in its natural state, no sooner was it turned into a water meadow than the drainage before sufficient showed itself to be incomplete, and a still deeper drain,

and a lower level, and a quicker run for the water was obliged to be had recourse to.

Another instance of the incompleteness of shallow drains, where bottom water exists, was afforded in some works at Bestwood Park, near Nottingham. The land, in this case clay, had been thoroughly drained with tiles at 20 inches. It was to be pared and burnt, but the ground remained in so wet a state that the sods could not be got dry enough to burn. As the only certain remedy, Mr. Tebbett proposed a drain 12 feet deep, and cut 4 feet into the sand rock below the clay. By this, the spring water which proved to be only a moderate and inconsiderable supply, was cut off, the land below soon became dry, and the sods fit for burning.

It may be laid down, therefore, as an axiom, that to effect a perfect drainage, spring water, pressing upon land, should, in all cases, be cut off, and in land to be watered, a more thorough drainage is necessary than for any other purpose.

The drains in the boggy lands at Clipstone lie about 12 feet deep; in some instances considerably deeper. The price, exclusive of the cost of tiles, of cutting, completing, and filling in a drain 12 feet deep, is 1*s.* 4*d.* per lineal yard; of 9 feet deep, 10*d.*; of 6 feet, 6*d.* Where hacking is necessary through stone or rock, the work is more expensive; a 12-feet drain would be 3 feet at top, tapering down to 1 foot.

It is most important in these deep drains, the first cost of which is so great, and which lie so far out of the way of repairs, that the tiles should not only be strong and sound, and placed on flat tiles for a firm bottom, but that they should be amply large; for it seems that if at any time the volume of water should be so great as entirely to fill the tile, a sort of slimy weed will in some soils form in the drain, at the imminent risk of filling up the tile. Still more is it most imperative that the outfalls should always be kept clear, for in cases where the water has been backed up in drains and allowed to stagnate, the growth of this slimy weed has been most rapid and most injurious.

Too great care cannot be taken never to carry these deep drains within a very considerable distance of trees; their roots seem to be attracted in a wonderful manner by the moisture of the drains, and if they once find their way into the tiles, they throw out bunches of fibres, which soon mat together and stop the drains. It is astonishing the depth that the roots even of the smaller vegetables will descend after the water: a deep drain outside the garden-wall at Welbeck was entirely stopped by the roots of some horseradish plants at the depth of 7 feet in the ground. At Thoresby Park, Lord Manvers's, a drain 14 feet deep was entirely stopped by the roots of gorse growing at a distance of 6 feet from the drain. At Saucethorpe, an estate of Lord Manvers, in

Lincolnshire, a drain 9 feet deep was filled up by the roots of an elm tree which was growing upwards of 50 yards from the drain; but under these peculiar circumstances;—the elm tree grew at the end of a sunk fence, the wall of which was formed of turf. The root of the elm got between the turf wall and the solid bank, and worked its way along till it got into the drain, which it soon filled up. The roots of all trees will stop drains, but especially of soft-wooded trees, such as willow, alder, poplar, &c. Ash trees, too, are very dangerous neighbours to deep drains. In one case the roots of grass stopped a drain 2 feet deep in the parish of Mansfield Woodhouse; the drain had been carried across a field of old turf to convey water for cattle from a higher level. The explanation of this disposition of the roots both of vegetables and trees to strike deeper than ordinary in pursuit of drains appears to be this:—in digging the drains, the sides are cut down straight, and the ground left like walls on each side, while over the drain the earth is all moved; between the solid and the moved soil for a long time something like a fissure or crevice remains. When the roots in their progress through the solid land reach this fissure, they pass down it, and so follow its course into the drains.

The produce of the meadows is very great, exceeding all anticipation. They are farmed in the following manner:—Early in January, Southdown ewes, with lambs bred early for this purpose, are turned on the meadows. In this early season they are assisted with cabbages; but the ewes and lambs always do well on the meadows, and they appear to be particularly healthy for the lambs, very few dying suddenly, as will often be the case on fresh seeds. Ewes are put on with their lambs as they are born and gain strength; and in this way, from January to the end of March, and in some parts till much later in the spring, even till late in May they are devoted to ewes and lambs, feeding the lambs fat, which are sold at that early season at from 24*s.* to 30*s.* each. The land is then shut up. Some at the beginning of April; other portions later, in rotation. The most forward meadows will be ready for cutting green by about the middle of May, and will yield from 16 to 20 good cart-loads of green fodder per acre, which is carried to cattle in yards. In about 6 weeks a second crop is ready, which, with the allowance of time necessary to clear the first crop from the ground, and to apply the water, will carry this second cutting to the middle of July. After this an eddish will be left to be eaten by sheep and cattle in the autumn and early winter. The meadows which are first cut will frequently allow of a third cutting of green food, but the eddish in that case will of course be of less value. Speaking, therefore, of the whole range of meadows, to say that besides the sheep feed in the spring they will afford two green cuttings and an eddish, is to be rather under than above the mark. Some portions are allowed

to stand for hay, and are mown after having been stocked late, early in July, yielding two tons to the acre, and leaving, as in the other case, an eddish for the early winter.

The value, however, of these meadows cannot by any means be estimated by the worth of their own produce alone, however large that may be, their collateral benefits are so great. Requiring themselves no manure but the water, they afford, through the cattle fed in yards on their produce, such a weight of manure for other land, that large districts have by these means been brought into profitable cultivation; and though the water itself runs over only about 300 acres, it may be said to enrich five times that extent; and again, by the early food they supply in the spring, stock can be kept off the young seeds till they have gained a head, which is a most important advantage on a farm, and one that, if a dry summer should follow, can hardly be too highly appreciated.

As the meadows are farmed by the Duke of Portland, kept with the adjoining arable land in his own hands, no statement of their value in the shape of rent can be supplied; but the subjoined paper has been prepared, setting forth in a tabular form their produce, the way in which it is disposed of, and an estimate of its value:—

Produce of an Acre.

				£.	s.	d.
Keeping from Jan. 1 to end of March, 2 ewes and lambs, the 2 lambs sold fat at 24*s*. each	£2	8	0			
Deduct shepherd's wages	0	6	0			
				2	2	0
From April 1 to the end of July twice cut green 18 loads of green fodder, each cutting—total 36 loads, at 7*s*. per load	12	12	0			
Deduct expenses mowing and carting, 2*s*. 6*d*. per load	4	10	0			
				8	2	0
Eddish				1	10	0
				£11	14	0
Or, if mown for hay:—						
2 Tons of hay at 3*l*. per ton	6	0	0			
Deduct expenses	1	0	0			
				5	0	0
In this case, as the land would be pastured so much later through April and May, it would feed 4 lambs fat instead of 2: 4 lambs at 24*s*.	4	16	0			
Deduct shepherd's wages	0	12	0			
				4	4	0
Eddish				1	10	0
				£10	14	0

Nothing is here charged for the cabbages brought on the land to assist the early ewes and lambs. The 600 stock ewes and lambs kept on the meadows during the same time are set off against this expence.

	£.
Taking, therefore, the total quantity of meadow at 300 acres, and the mean value at 11*l*. 4*s*. per acre, this would give a yearly value of	3360
Putting the value of the manure produced for the arable part of the farm at	200
And the saving by allowing the seeds to become a full pasture before they are stocked in the spring, at	100
The total annual value would be . . .	3660

3660*l*. divided by the number of acres, 300, would give an annual value per acre of 12*l*. 4*s*. From which deduct wages for superintendence by Mr. R. Tebbett and two men, amounting to about 10*s*. per acre, leaving 11*l*. 14*s*. per acre. Taxes and assessments not deducted.

Expenditure from 1816 to 1837.

	£.	*s.*	*d.*
Levelling ground, forming carriers, draining, &c. .	32,874	5	7
Draining only since 1832	1,206	9	4
Bridges, sluices, stop-gates	5,216	6	2
	£39,297	1	1

There has also been an expenditure in farm buildings in Clipstone Park, and near Clipstone, during the same period, of 13,825*l*. 10*s*. 10*d*., but a very small share of this sum should be set to the distinct account of the meadows. The larger part of the cost of these buildings should be referred to the arable land, which has been brought into cultivation around. The large barns and stables requisite for an arable farm of 1600 acres, the steam apparatus for hay, &c., as well as all repairs and painting, for a period of 23 years, are all included in this sum of 13,825*l*.

There remains behind a topic of extreme difficulty, viz., the liability of sheep fed in these meadows at certain seasons to take the rot. On this subject, though the greatest pains have been taken to arrive at something like certainty, the results are so at variance one with another, the experiments so contradictory, that no certain conclusion can be deduced from them.

It has been said that the meadows are particularly healthy for ewes and lambs in the spring, but this is not wholly without an

exception, as will be seen by the following communication from the Duke of Portland, who has bestowed personally great attention on this point.

"The ewes fed on the water-meadows in the spring of 1838 were found to be rotten the same autumn. It is impossible to ascertain exactly where, or on what meadows, they had taken the disorder; but there is great reason to believe that they took it on two meadows east of the park, which were certainly not sufficiently drained, for they appeared to be very poisonous in that way to sheep fed upon them the same autumn. None of the irrigated meadows can be said to be quite safe for sheep in autumn, not even those which are on the land naturally most dry; yet this wet autumn (1839) no sheep has been affected even on those meadows which owe their dryness entirely to draining."

The following statement, also from the Duke of Portland, enters into further detail on this point:—

"In the year 1806, about 25 acres of land, lying below the lake-head at Welbeck, were formed into a water-meadow. The greatest part of the land was a morass, and had besides been robbed of its soil, which had been taken to form the lake-head itself and another made below it, with the intention of forming this land into a continuation of the great lake. But this lower head was undermined by the water and thrown down, and was never restored. Some of the land was apparently dry enough for anything but a water-meadow, but much of it was bog-land, and much of it was tenacious gravel, and very little of it was kind sand. There was not sufficient fall to the river to dry the lower parts of this meadow, and consequently they were always very wet, and produced rushes and flags. Nevertheless, it was very useful for a meadow, and particularly for the spring-feeding of ewes and lambs, which were fed upon it in that season for 20 years, without any one having ever shown any symptom of the rot. In dry summers, also, it produced tolerable crops of hay, without ever being manured.

"About the year 1826, having seen the great effects of the water on the meadows, which had been formed with the greatest skill by the late Mr. Tebbett, I caused this meadow to be new modelled and more efficiently drained under his direction. Accordingly, it was again laid down to grass and watered, and its first produce was most promising; but, after the first crop was mown, the grass, which had been most luxuriant, never grew well again, and for several years the produce was very trifling. But what was most surprising was, that the ewes and lambs fed upon this land in the spring invariably took the rot; and not only did they take the rot in the lowest parts of these meadows, which were not more than 3 feet above the level of the water, but

also equally on the highest parts of them, where the water in the drains was not less than 9 or 10 feet below the surface. I tried every expedient to combat this disorder: I tried a medicine prepared by a chemist at Newark, of which I had proved the efficacy in curing the rot many years ago. I tried every expedient, such as I have no doubt had been successful in other places—viz., taking the sheep off the land at night, and giving them dry food on dry land, and giving them linseed-cake. But with my flock every expedient failed. Last of all, I have effectually drained the land by bringing up a level from an outfall near a mile below it, at an expence greater probably than the land is worth. Since this operation has been performed the appearance of the surface is certainly much changed; the grass is much more abundant, and during the spring of 1838 it did not rot the sheep; the only year in which they have been hazarded upon it since the more perfect drainage, the abundance of food this spring (1839) having prevented any sheep from being put on the land.

"There is, therefore, only the experience of one year, that any good, as respects the rot, has been done by this effective drainage. But if it has really effected this change, it is very extraordinary; for now, upon the lowest parts of these meadows, the water still is nearer the surface than it was before on the highest: and as formerly the sheep rotted as much on the highest as the lowest, it seems impossible to account for the present wholesomeness of the lower lands, where the water is still nearer the surface than it was formerly upon the higher land. There is, however, this difference. The drainage now is constant, because the outfall is never stopped; whereas, formerly, whenever there was much water in the river, into which the drains discharged themselves, the water backed up into them, and their action was sometimes stopped in the wettest weather for many days. That this may have considerable effect is probable from what has been observed in the present year. A meadow, between Carburton bridge and Carburton chapel, in other respects very good and very productive, has always rotted the sheep fed upon it, till the outfall of the drains was made better. In this case very little additional depth was gained for the drainage, but the outfall was made more independent of the flushes of the river. It is true that, in each of the cases I have mentioned, we have but the experience of one year, and subsequent trials may perhaps contradict them both. Whether they do or not, it seems impossible to account for the absence of the rot during 20 years, when the land was much wetter, the drainage more imperfect, and the drains more frequently stopped than they have ever been since."

THE FLOOD MEADOW VALVES.

Fig. 1 is a cross section of the said valve, showing the position of the door or valve when opened.

Fig 2 is a plan of a valve used in the Clipstone Park Flood Meadows, for admitting water out of the principal carrier into the side channels. The aperture is 9 inches square.

Fig. 3 is a plan of a larger-sized valve, used for a similar purpose to the smaller one. The aperture is 18 inches long by 12 inches wide.

Fig. 4 is a cross section of the same, showing the door or valve as when closed.

Figs. 1 and 4 are the positions in which the valves stand when fixed to the mouth of the stone trunk through the embankment.

Each door or valve is faced with strong leather fastened on by means of copper rivets, with flannel steeped in tallow put between the metal and the said leather.

The dotted line is the supposed height of water in the main carrier.

SHUTTLES.

Fig. 5 and 6. Plan and elevation of a shuttle used for various purposes in irrigation, with ashlar stone work for supporting the same.

This shuttle is raised in the centre by means of the screw *a*, &c. as shown in the elevation.

Fig. 7 and 8. Plan and elevation of a shuttle which is placed across the river before entering the main carrier.

This shuttle is used for diverting the stream from the carrier into the by watercourse, occasionally required.

The manner in which it is raised will be seen by the drawings.

XL.—*Rural Economy of Schleswig, Holstein, and Lauenburg.* —By J. Stanley Carr, Esq., of Tüschenbeck, Duchy of Lauenburg.

These duchies, extending over a surface of 337½ square German miles,* comprising 30 large cities and towns, 36 market-towns, 1900 villages, and 717,300 inhabitants, are the German provinces of His Majesty the King of Denmark, who has long been Duke of Schleswig and Holstein, but of Lauenburg only since 1816, when it was exchanged by Hanover for East Friesland. Their earliest history is obscure; but there is no doubt that the Anglo-Saxon invaders of the British islands emigrated from thence, and probably from the district still called Angeln.

Their geographical position is most favourable, lying between 53° and 55° north latitude. That great artery of commerce, the magnificent Elbe, forms, with the German Ocean, their western boundary; whilst, on the east, the many commodious harbours of the Baltic give unusual facilities for trading with the regions of the north: both seas are connected by the Schleswig ship-canal.

The face of the country is alternately flat or gently undulating, and characterised by the same sandy and moderately elevated ridge as Mecklenburg; the soils to the east and west, as they decline to either sea, being likewise identical in their stratifications of valuable marls, and other indications of submerged origin. The climate is moderately moist and temperate, differing little from the midland counties of England, except that the cold is more steady and intense in winter, and the summers warmer and drier. The worst feature in the seasons, as they regard agriculture, is the prevalence of night frost in April and May, when vegetation, vigorously stimulated by an ardent sun during the day, suffers proportionally more than in Britain.

Without entering deeply upon the highly instructive geological phenomena of this peninsula, the mighty changes which have occurred on its coasts may yet be interesting even to the general reader.

There once existed, divided from the western coast of Schleswig by a narrow channel, an island, called North Friesland, known to have been from 12 to 13 English miles long, and 8 or 9 miles broad, of unusual fertility: when, about the year 1240, a gigantic flood overwhelmed a great portion of it, and compelled its ample population to take refuge upon the remaining part, about 5 English miles in circumference: from that time called North Strand. Although numbers perished on this occasion, there still remained

* One German mile is nearly 5 English miles.

above 9000 inhabitants, subsequently celebrated for their intelligence and concentrated industry; when, on the evening of the 11th of October, 1634, "the windows of heaven" were opened, whilst a fearful hurricane lashed the frenzied and resistless ocean to an unprecedented height; and 1500 houses, many churches, 6000 men, and 50,000 head of cattle, sunk, to rise no more. A few small islands, called the Halligen, alone remain; melancholy monuments of this appalling catastrophe.

It is believed that seven considerable islands have been lost in a similar way, between the Texel and the Eider, the materials of which, becoming more or less soluble, have been carried by north-westerly gales to the shore of Holland and Schleswig-Holstein. The waters of the German Ocean, always turbid after high winds, have continually deposited along those coasts layers of sand, mud, and shells. This operation of nature is assisted by the formation of banks or dykes, which catch the heavier particles of each receding tide; and, though low at first, by gradual manual assistance on the one hand, and accumulated deposits on the other, become sufficiently broad for two waggons to drive on the top; and high enough—with an angle of about 35° to the sea—to resist the encroachments of the ocean; which rises, on those coasts, with a gale from the north-west, at spring tides, to 14 feet above the ordinary high-water mark. Nothing can exceed the care with which these dykes are ultimately finished off and watched over: nor is it likely that the awful lesson taught the inhabitants in 1216, when 10,000 souls perished by the failure of the Eiderstädter and Ditmarsh dykes; and more recently, in 1825, on the Hanoverian marshes of the Elbe, will ever be forgotten. Flood-gates are inserted wherever it is necessary to allow rivers to escape at ebb-tides; and windmill-pumps, of small but efficient construction, are judiciously placed to work away the superfluous water of rainy periods or springs.

The approach of summer is always looked to with anxiety, as a sudden thaw of the ice-bound lakes and rivers, which discharge their waters into the Baltic, causes such a redundancy in that sea, that, rising to many feet above the ordinary level, it relieves itself by a current through the Belts and Cattegat, of such furious velocity that some of the Danish islands, especially Alsen and Barsö, are being diminished even to the amount of an acre annually. If it unfortunately happen, that at the same moment a heavy gale from the north-west, conjoined with a spring-tide, should send an unusual portion of the great Atlantic into the North Sea, the accumulation becomes most threatening to the inhabitant of the marshes; that same gale, however, which causes his alarm, furnishes the power by which his active little pump-mills are struggling for his safety. The most recent

acquirement is called the new, and its landward neighbour the old marsh; and by such slow progression has this valuable district, now containing a surface of nearly 65 square German miles, been gained by the industry and ingenuity of the inhabitants. There can be no doubt that the Elbe, aided by its many tributaries, has, in its course of 1100 English miles, contributed the washings of many a large city and fertile district to the composition of these soils, which may indeed be termed of inexhaustible productiveness. The mass, when wet, is of a bluish-grey colour, greasy, and adhesive to the touch; when dry, hard and tough. It is therefore difficult to cultivate, as the critical moment when it is neither wet nor dry must be seized on. Analysis has given the following result:—

Siliceous earth	0·86
Clay	0·04
Oxyde of iron	0·03
Carbonate of lime	0·002
Gypsum	0·009
Humin	0·014
Loss	0·045
	1·000

It may easily be imagined that the population is wealthy and dense where all things are yielded in superabundance. The farms seldom exceed 200 acres, and are not often under 50. It is usual to leave a proportion 8 or 10 years in pasture; which reminds me always of the luxuriant vegetation in the American prairies. It is not uncommon to let grass-land in the marsh for 12 dollars* per English acre. When grass is ploughed, oats are sown; the second year, fallow; third, winter barley; fourth, rape for seed; fifth, wheat; sixth, oats; seventh, beans; eighth, oats. Rye grows too rank. Great pains are taken to plough a deep furrow, with four heavy horses, and the land is free from weeds and couch, no doubt owing to the smothering effects of heavy crops, which often return as much as—

Rape-seed	20 sacks of 200 lbs.	per English acre.
Wheat	12 to 14 sacks of 220 lbs.	,,
Winter barley,	25 to 30 sacks of 200 lbs.	,,
Oats	30 to 36 sacks of 160 lbs.	,,

Horses, sheep, and cattle are upon a large scale; but, as in all cases of abundant food, and the absence of science and skill in breeding, they are coarse, and, what would be called in England, unprofitable stock. The quantity of thin milk which the

* A dollar is about 3*s*. 6*d*. sterling.

large cows give is generally from 30 to 40 quarts a-day, immediately after calving; but, as the return of butter is disproportioned, it is found more advantageous to fatten oxen, which are bred in Jutland in great numbers. Large towns, far and near, are thus supplied; and the celebrated Hamburg beef bears testimony to their excellency.

The agricultural implements of the duchies are quite as primitive as those in the neighbouring countries. On the lighter upland ground called "geast" a wheel-plough, with wooden mould-board, drawn by two horses, though without a driver, turns the soil to the depth of 3 or 4 inches, either standing on edge or laid entirely flat. There is no such thing as a straight ridge and furrow; but the land is worked into round beds of 30 or 40 feet broad, separated by an open drain 2 feet wide, bordered by grass and weeds. The harrows, with the exception of the brake, have generally wooden teeth, and are worked in a circle, as in Mecklenburg.

The rotations, on good lands, are much in unison: first year, fallow, dunged; second, rape-seed; third, wheat or rye; fourth, barley; fifth, oats; sixth, oats, sown down with red clover (8 lbs. to the acre, and 6 lbs. of Timothy or rye-grass); seventh, clover for hay; eight, ninth, tenth, and eleventh, pasture.

The effects of gypsum, so extaordinary in Mecklenburg and Prussia, are but partial here, notwithstanding many trials; I believe, because marl having been universally applied, its carbonate of lime uniting with sulphate of iron, frequently present in the soil, has already formed an analogous substance.

The proprietors and large farmers are well-informed and intelligent men. The labouring classes may also bear comparison with those of most other countries for sobriety and general good conduct, civil and even polite to one another, respectful and obedient to their superiors—in no way disgracing the historical renown of the ancient Cimbri. The laws compel parents to send their children to the public schools until they are confirmed, at the age of fourteen or fifteen; nor can they claim ecclesiastical or civil rights until these regulations have been complied with.

Yet the reflecting stranger is surprised at the anomaly presented by a fine soil and climate; an intelligent, civilised, and instructed population; the mildest and most paternal government; and, at the same time, great backwardness in the construction of their roads and the cultivation of their fields.* But when it is remembered that the present is the only period of profound peace and security that the Continent can be said to have

* One fine Macadamised road now exists between Hamburg and Kiel; another, nearly completed, between Hamburg and Lübeck; and the country seems roused to the importance of good communication.

enjoyed for centuries, it will not be wondered at that the agriculturist got into a habit, not yet shaken off, of making his calculations for the exigencies of the passing moment. The worse the condition of his stock, the less likely were they to suit the wants of the large armies, the sound of whose cannon too frequently disturbed the even tenor of all tranquil occupations. In 1806 the right wing of Soult's army bivouac'd for a few days on this estate; and, during that short time, devoured 260 milch cows and 600 sheep, at the home-farm and the villages; which would have undergone the same fate, whether they had rejoiced in a beautiful form, conferred by the genius of a Bakewell, or belonged to the long-legged, unimproved flocks and herds of the country.

But, in my opinion, a more powerful, though less obvious, and unfortunately less temporary impediment to improvement, lies in the nature of the tenures by which a large proportion of the peasantry hold their lands. Previous to 1804* they were serfs, subject to the then usual servitude on the domains of their lords; at that period they were emancipated from most of the laborious and all the degrading requirements of feudal times, which were commuted for a small money-rent, now wholly inadequate to the value of their farms, which range from 50 to 100 acres; and, descending from father to son, leave the peasant careless about the future, and free to live if he please (and he generally does please) in complete idleness. He seldom applies his own hands to any troublesome purpose, but hanging about, with his pipe, of a rotundity as unnatural as his own, casts a lazy influence over every living thing within his reach; presenting an exhibition of one of the extremes in the social condition, and doubtless the most hopeless for the cause of advancement.

The passing philanthropist may draw cheering pictures of the happiness which he imagines must exist here—especially if he have recently been in Poland or Ireland; but a fourteen years' residence has convinced me that, wherever the population does not require to make any effort, exactly in that ratio is all improvement at a stand-still; and evil occupations, in the absence of good, called in to pass the heavy hours. The cultivator (bauer), with little rent, less taxes, and few cares, but no stimulus to exertion, rises late, spends his days in indolence, and too frequently his nights in gambling and drinking at the village public-house. Bankruptcies are not unfrequent, although his interest in the land is difficult to alienate. His dealings are not seldom characterised by low cunning, and an absence of that sturdy uprightness which active industry is calculated to foster, and which

* Lauenburg was freed, under George III., in 1792.

makes a hard-earned dollar to be more highly prized than ten times as much obtained by a clever bargain.

Merino sheep do not succeed at all in the marshes; and every attempt to introduce them in Schleswig and Holstein, with the exception of a very few high and dry lying lands, has failed.

But the pride and boast of the Holsteiner is his dairy; and the fame of Holstein butter, which, if we except that made in Holland Proper (or Delfland), may well claim to be the best in the world, not only justifies his preference, but may render a sketch of those peculiarities of management, by which the Holstein dairy system is more especially distinguished, neither uninteresting nor useless to the English farmer. These may be chiefly classed under four heads:—viz., the buildings and utensils; the time of milking, and number of hands employed; the management of the milk; and the mode of working, salting, and packing the butter.

The buildings indispensable to a large dairy (which varies from 100 to 400 cows) are, a milk-cellar, a butter-cellar, a churning-house (and closely adjoining the horse-mill by which the operation of churning is invariably effected), a cheese-room, and a kitchen, in which not only the various utensils are washed, but the food cooked for all the persons immediately engaged in the dairy-work; to which must commonly be added their sleeping and eating apartments, as, on large estates, the whole of the establishment is usually kept apart from the mansion-house. The size and site of the milk-cellar are esteemed matters of first-rate importance: it ought to front the north; be shaded from the southern sun by rows of trees—elder being especially selected for this purpose, and indeed placed if possible near the windows, on account of their influence in keeping off the insect tribes; and a thatched projecting roof is preferred, affording greater protection from the heat: while, in choosing the site, peculiar care is taken to place the dairy beyond the reach of everything calculated to generate bad odours, or in any way taint the atmosphere. The size of the milk-cellar must necessarily be regulated by the number of cows, but it should always be calculated to contain the produce of four milkings; and as the milk-dishes usually occupy a space of two feet square, the produce of 100 cows, giving on an average 8 quarts per day (a large average for the cows of this country throughout the year), would fill 50 milk-dishes at each milking, and would require a ground surface of 500 square feet, as the milk-dishes are invariably placed on the floor, the amount of each milking a little apart; and there must unavoidably be spaces left, to enable the dairy-maids to go through their various operations of skimming, sieving, and removing cream, &c. The floor, though sometimes flagged, is

more generally of brick, neatly fitted, so that no water may lodge in the joints; and always gently inclined, with a grated opening at the lower end, to facilitate the mopping and washing of the floor, which is never omitted to be done twice a day, notwithstanding that every avoidable impurity is carefully guarded against, and every drop which may fall at the time of the milk being strained is instantly wiped up. A great improvement has been recently made in some newly-arranged dairies, by dividing the floor into compartments with brick ledges, from 3 to 4 inches high, between which the milk-dishes stand; and the compartments (the lower extremity of which is fitted with a small sluice) being filled, by means of a pump, with cold water twice a day, the milk is preserved so cool as to prevent all approach to acidity for several hours longer than when placed on a dry floor; thus affording, even during the summer solstice, sufficient time for a complete separation of the milk and cream, without which the full proportion of butter cannot be obtained. For effectuating the same desirable result, ice is frequently resorted to in sultry weather, either by dropping a piece of pure ice in each milk-pan, or by placing a pailfull in the dairy, which, by giving off its cold, sensibly lowers the atmospheric temperature.

It is considered necessary that the milk-cellar should be sunk from 3 to 4 feet in the ground; be from 16 to 18 feet high (the best have an arched roof, as being more conducive to coolness than boards); and be furnished with two rows of windows, (and, if possible, on three sides, north, east, and west,) to secure a thorough air. The lower range consists of wooden trellis-work, provided inside with gauze frames to exclude insects, and outside with hanging shutters, which can be lowered and elevated at pleasure. The upper range is furnished with glass sashes when light only is requisite, which are exchanged for gauze frames, when more coolness is desirable. The butter-cellar also must be light, airy, and cool; being likewise sunk in the ground, and the same precautions adopted as in the milk-cellar, to secure an abundant current of pure air. In it the butter, when carried from the churning-house, is worked, salted, and packed, and the filled butter-casks ranged on clean boards, somewhat elevated above the floor to admit a free passage of air, are weekly turned and wiped.

Next in order comes the churning-house, which differs in no respect from similar arrangements in England, excepting that, of late years, the perpendicular movement of the churn-staff has been exchanged for the rotatory,* which is found to churn in a shorter time, and with less risk of producing, even in hot weather, what is called oiling.

* Seventy-two revolutions per minute.

The cheese-room is never admitted near either milk or butter-cellar, and is, in newly-arranged dairies, placed as far as may be from them. In fact, as cleanliness forms the great object of the Holstein dairy system, the closest attention is paid to guard against every impurity, and to remove everything from the vicinity of the dairy which could, by possibility, exercise a sinister influence on the very susceptible substances of milk and butter; which suffer, to a degree those unaccustomed to observe it would little suspect, from a tainted atmosphere. As the preparation of cheese is better understood in England than here, I will only mention that three sorts are made, sweet milk, skimmed milk, and occasionally what is termed cream cheese; and shall now proceed to describe the management of the milk, first enumerating the number of persons required. These consist, in large dairies, of a meyer or overseer, a cooper, one or two cow-herds (as may be requisite), one or more swine-herds, an upper dairy-woman, and dairy-maids in the proportion of 1 to every 18 cows. The overseer's duty involves a general charge of the cattle, whether in health or sickness, with a competent knowledge of their diseases and the remedies; he is responsible for the swine being properly cared for; that the calves, whether fatting or rearing for stock, are regularly and suitably fed; that the cow-herd does his duty; that the hours of milking are punctually adhered to; and that everything and every person is in proper place and keeping. He must further pay strict attention that the cows are milked thoroughly out, on which so very much depends; as not only the cow which is allowed to retain any portion of milk diminishes her produce by so much from day to day, but the last, being by far the richest part, a loss of butter is incurred, much more than proportionate to the quantity of milk, by this culpable negligence or laziness. According to the observations of an accurate examiner, Dr. Schübler, the first drawn milk contains only 5, the second 8, and the fifth 17 per cent. of cream! If the number of cows be not above a hundred, the overseer can also undertake the cooper work; which, when wooden milk dishes are used, in addition to the cream-barrels, milking-pails, and butter-casks required in the course of a-year, is a consideration both of time and expense. But in large dairies, a cooper is kept in addition, who however must likewise milk a certain number of cows, assist in carrying the milk, feeding the cows when housed, or any other dairy-work which a man is capable of. The wages of these two persons vary according to the extent of the dairy, but may be averaged the first at 60, and the second at 40 dollars per annum.

The dairy-maids, besides milking, cleaning the vessels, &c., work in the garden in summer, spin in winter, and wash, bake, brew, and cook for their own establishment, under the superinten-

dence of the upper dairy-woman, who is by far the most important personage in it, as on her skill, attention, and diligence depend, in great measure, both the quantity and quality, and, by consequence, the profit of the produce. She must not only thoroughly understand, but accurately observe, the moment when the milk should be creamed; the degree of acidity it must attain in the cream-barrels; its temperature, whether requiring the addition of warm or cold water to the churn, as well as the all-important operations of kneading, beating, salting, and packing the butter. She must not only be punctiliously clean herself in person and work, but keep a strict eye over the cleanliness and order of her subordinate maidens. In very large dairies the upper woman has full employment, without milking, and needs the assistance always of one, and sometimes of two, of the more experienced dairy-maids, in butter and cheese making; but in smaller establishments she milks a certain number, generally 10 cows, while each of her subordinates have 18; her wages are usually 55 to 60, that of her chief assistants 22, and that of the others 18 dollars per annum.

During summer the dairy people must rise at three, and even two in the morning, if the weather be very hot; for which they are indemnified by two hours' sleep, from 1 to 3 in the afternoon. At 4 they commence milking, which takes place in the field, and generally occupies two hours. At the beginning of the season each girl marks her own cows by tying a particular coloured ribbon round their tails, and in some places they adopt the precaution of the milkers carrying a string on which they cast a knot as each cow is successively milked, thus securing against one being forgotten. As the fields are large, and often at a great distance, the transport of the milk is facilitated by the very simple contrivance of a long, low, four-wheeled, one-horse waggon, in the side bars of which strong iron hooks are inserted, at such distances that the milk-pails, containing from 30 to 40 quarts each, may swing free of each other, and these, though filled nearly to the brim, are prevented spilling, notwithstanding many a rude jolt over the rough, and often deeply-rutted road, by merely having thin pieces of wood, about the size of a dinner-plate, floating on the surface; a practice, indeed, universal in these countries, when pails with any liquid are carried even in the hand. The milk when brought to the dairy is immediately strained through a hair sieve into the vessels, whether of wood, earthenware, copper tinned, zinc, cast-iron, (lined with a china-like composition), or glass, placed in rows on the floor. All these different kinds of utensils have been tried with various success, in the hope of discovering how, in hot weather, more especially when a thunder-storm is gathering, the milk can be guarded against a too early acidity; for, as it is a fixed and invariable rule that the cream must be removed from the milk before

the latter gets at all sour, and an equally established fact, that all the oily particles cannot be obtained in a shorter period than 36 hours, vessels in which, during sultry, and especially damp weather, the milk could be kept the due time, are a great desideratum. As yet, however, there reigns much diversity of opinion on the subject, and shallow wooden vessels, as nearly as possible equally wide at top and bottom, containing when full about 8 quarts, but in which during summer seldom more than 6 quarts are poured, are in most general use. They have, however, some disadvantages, of which the chief is the great difficulty and the consequent labour and close attention requisite to remove all acidity, (which in some states of the atmosphere is almost unavoidable,) and which, penetrating the pores of the wood, sometimes resists all the patient scrubbing; first, with hot water and small birch scrubbers, and secondly, with boiling water and a hard round brush made of pigs' bristles (with which every hair's-breadth is carefully polished over), so that the despairing dairy-maid is compelled to resort to washing in a ley of wood ashes, or boiling, or even scorching over lighted chips, followed by countless rinsings in pure spring water. To diminish in some measure this labour, the plan of painting the milking pails and dishes with a preparation of cinnabar, linseed oil, and litharge, has been adopted by the milk-venders in towns, and in some country dairies: not only, however, is the expense considerable, as the vessels must be finished off with peculiar care, and require to get 3 coats of the composition at first, and one yearly afterwards, but the milk for some days after they are brought into use has a perceptible taste of paint. The tinned copper milk-pans are very costly, and must be carefully watched lest they should require re-tinning. The zinc are as yet little known, and the assertion of their effect in better severing the cream from the milk not sufficiently proved. The cast iron, lined with enamel, though assuredly durable and very clean, seem too expensive; and the glass have many opponents on account of their brittleness, and the vague notions respecting glass and electricity inducing the idea, that if the electric fluid get into the milk, it cannot get out again! whereas, as it is ascertained that it always attaches itself to a conductor, and, in the absence of anything more attractive, runs along the surface, it is more likely that the milk should be protected in glass, which is a non-conductor, than in any other substance. In my dairy, which contains upwards of 180 cows, the glass vessels have been used for 4 years; and I give them a decided preference over all others. Their form is good, being 16 inches broad at the top and 12 at the bottom: the glass is dark bottle-green, transparent, and perfectly smooth, about one-eighth of an inch thick, and provided with a rounded rim at the

upper edge, which makes it easy to retain a safe hold of them, even when full. They contain 8 quarts, but never receive more than 6. They cost 8*d.* a-piece, and their durability may be estimated by the fact, that to encourage carefulness, each dairy-maid is allowed one dollar per annum extra, as *pan money*, being bound at the same time to pay 10*d.* for each one she breaks, yet hitherto no girl has broken to the extent of her dollar. It is self-evident that acidity cannot be communicated to glass, and the ease and rapidity with which they are cleaned, requiring merely to be first washed with lukewarm water, then rinsed in cold water and placed in a rack to dry, effect such a saving in fuel and labour (diminishing the number of our dairymaids by at least 2), that the less quantity of butter obtained, supposing (which I by no means concede) that the milk, during a few weeks in summer, does sour sooner, and consequently throws up less cream in glass than in wood, is more than compensated by the lessened expense of the establishment, not to mention the great advantage of attaining the indispensable cleanliness and purity of the vessels, with more certainty, because at a less expenditure of time and trouble. Although it is an ascertained and undeniable fact that the quality of butter depends much on the nature of the pasture, the locality of the dairy, the universally prevailing cleanliness of the whole management, and *very* essentially on the purity of the water employed, still I ascribe much of the reputation which our butter has of late years enjoyed (and which is verified by our obtaining at all seasons one penny per pound above the market price in our neighbourhood) to the beneficial introduction of glass milk-dishes. It is further to be observed that, if occasionally a small portion of cream should remain incorporated with the milk, the loss is not total; being either redeemed by the additional goodness of the skimmed milk cheese, or at worst, enjoyed by the rearing calves and swine, which must ever bear a proportion to the cattle kept. Ten calves per 100 cows is the estimated number necessary to be reared as stock, if purchasing, to supply the yearly deficiencies occasioned by age and disease, is to be avoided.*

* It has been communicated to me by Mr. Handley that the proportion of 10 per cent. yearly for cast cows appears very low. My sketch of our dairy husbandry is for the purpose of telling *what it is*, not what it might be. The remark is fair enough from any one accustomed to English farming, in which the outgoing cows are fattened for the butcher on turnips; and there can be no doubt that this is the most profitable mode, always presuming that there are turnips, or some such cheap nutritious food, in abundance; but, with the exception of my own farm, and of those where there are potato-distilleries (as in Prussia), there is nothing of the sort. It is, therefore, universally the practice to keep a good milch-cow, so long as she can eat her dry winter food, *i. e.* whilst her teeth are sharp: such a cow is often kept till she is 14 years old, and a younger, but worse milker, turned out in

It has already been stated as a rule, that the cream must be removed from the milk before any acidity is perceptible, if butter of first-rate quality is looked for; and it has been found by experience, that a cellar temperature of from 60° to 62° Fahrenheit is the most favourable; a complete disseverment of the cream then taking place in 36 hours: whereas, a greater degree of warmth, though it quicken the separation, still more hastens the souring process, which operates injuriously not only on the quality but the quantity of butter. In a cold temperature, the separation is effected much more slowly, so that 48 or even 60 hours may be required: this, however, is the longest period that may be accorded without incurring the risk of imparting a rank unpleasant flavour to the butter, which even, if not perceptible on its being first churned, manifests itself very shortly afterwards.

The commencement of acidity in milk is indicated by a very slight wrinkling of the cream, and a scarcely perceptible acid taste. So soon as these signs appear, the work of skimming must begin, even though the milk have only stood 24 hours; and the cream is poured through a hair sieve (which is kept for this purpose, and must never be used to strain up the new milk with) into large barrels, containing about 240 quarts each (usually sufficient for one churning), in which it remains till the necessary sourness is attained, which in summer follows in 24, in winter seldom under 36 or 48 hours; unless when the small quantity of milk admits of it being partly strained at once into the cream barrel, and the remainder added without skimming from the milk-pans when cool. This method, undoubtedly, gives at all seasons the greatest return of butter, but as is generally believed not of so rich a quality as that produced from cream alone; and, moreover, in a large dairy, during the time the cows are in full milk, would occasion much additional trouble, an almost ceaseless churning, and a total prevention of cheese making. The cream having attained its requisite acidity, during the advance to which it must be frequently stirred with a small churn-staff to prevent it coagulating, technically called becoming cheesy, the next object of the dairy-woman's skill is, the degree of warmth or coolness which must be imparted in order to secure good butter. In warm weather the churn is rinsed with the coldest procurable water, in which a piece of pure ice is often thrown, and sometimes, though more rarely, cold spring water is added to the cream about to be churned, which operation is then always performed either very early in the morning or late in the evening. In cold weather, on the contrary, warm water is applied, both to

her stead. These old animals are then sold to the poorest people for little more than the value of their skin. The statement, therefore, that 10 per cent. is the average renovation of our dairy-stock is correct.

rinsing the churn and to the cream itself. The churning being completed, the butter is taken off by means of a large wooden ladle, and carried in a tub directly to the butter cellar, where, in a large trough, hollowed out of the trunk of a beech or oak, very smoothly polished off inside, and provided with a plug-hole at the lower extremity (beneath which a small tub is placed to receive the expressed milk), the butter is slightly worked, and salted with the purest salt,* then moulded with the wooden ladle into a mass at the upper end of the trough, and left for some hours to soak and drain. In the evening it is thoroughly kneaded and beat, or rather slapped, the dairy-maid repeatedly lifting a piece of from 3 to 4 lbs. and slapping it with force against the trough, so as to beat out all the milky particles; and thus, lump after lump being freed from extraneous matter, the whole mass is spread out, receives its full proportion of salt (in all about $1\frac{1}{8}$ oz. per pound), which is worked with the utmost care equally through it, and again moulded into one compact mass. The butter in Holstein is seldom if ever washed: as water is believed not only to rob it of its richness and flavour, but as being itself susceptible of putrefaction, to be equally inimical as milk, to its preservation. When a sufficient quantity is ready to fill a cask,† the several churnings are once more kneaded through, a very little fresh salt added and packed into the barrel, which is made of red beech wood, water-tight, and previously carefully washed and rubbed inside with salt. Much attention is paid that no interstice shall remain either between the layers of butter or the sides of the cask. A cask is never begun to be filled until it can be completed, as thus alone the butter can be exactly of the same flavour and colour, which is probably one reason why small dairies, under whatever management, never produce such good butter as large ones, as the small churnings must remain long exposed to the air, until the requisite quantity is in readiness.

The qualities of first-rate butter are considered to be, 1st, a fine, even, yellow colour, neither pale nor orange-tinted; 2nd, a close, waxy texture, in which extremely minute and perfectly transpa-

* The purity of the salt is no doubt of great importance in the preparation of butter for the market. Throughout Holland, as well as in those districts, it is refined by skilful means of evaporation, and the greatest care is employed in making it; the best being understood to be made from sea-brine. Here, it is almost invariably manufactured either from pit-brine or rock-salt, without attention to anything but its strength; and our dairymen, we believe, make use of whatever salt they can procure, without knowing or caring for any difference in its quality; in consequence of which the Dutch butter, though not intrinsically worth more in its natural state than the Irish, always fetches more money.—F. Burke.

† Of these there are 3 classes, full-sized or tonne, containing 224 lbs.; half tonne, 120 lbs.; and thirds, from 106 to 112 lbs.

rent beads of brine are perceptible; but, if these drops be either large, or in the slightest degree tinged with milk colour, it indicates an imperfect working of the butter, while an entirely dry, tallowy appearance, is equally disapproved; 3rd, a fresh fragrant perfume, and a sweet kernelly taste; 4th, good butter will, above all, be distinguished by keeping for a considerable time, without acquiring an old or rancid flavour.

The butter of Holstein and Schleswig is classed under the different names of fresh milk, May, summer, and stubble butter, according to the season in which it is produced. The first denomination given to that made in spring, between the time the cows calve and their being turned to pasture. The second designates that produced during the month of May, after they have been sent to grass, which, though highly prized for its peculiarly fine aroma when fresh, is found not to keep well, and therefore, like the fresh milk butter, generally sent to market as it is made. By summer butter is understood, that obtained in June and July; from which time, till the cows are removed from pasture, the butter bears the name of stubble butter. Both the latter sorts, if properly made, keep well, and retain their fine flavour almost unimpaired till the following spring: and therefore, although stubble butter generally speaking stands highest in favour, and consequently in price, yet, in well-managed dairies, the June butter is little, if at all inferior to it. The small quantity produced between the time of the cows being housed and their becoming dry, is called old milk butter, and is least of all esteemed.

The cow-house is, of course, in proportion to the number of cows; but generally twice as long as broad, and calculated for four rows lengthways, standing head to head, with passages between floored with brick, and furnished with feeding and drinking troughs. One passage, if not both, is broad enough to admit a loaded hay waggon, and is provided with large folding doors at each end, while there is also room behind the cattle sufficient to permit the manure being sledged out with a horse, without incommoding them. The lofty roof affords spacious accommodation for hay and straw, which is also considered useful in keeping the house warm in winter; for the same reason the doors are kept as much as possible shut, and sufficient light admitted by small glazed windows. The quantity of food which can be afforded to the cows during winter is ascertained at the beginning of the season, when the harvest returns are known; and, in plentiful years the calculation is, that each cow should be allowed 3 sacks of grain, (generally oats of 140 lbs. each sack), 3900 lbs. of straw, including bedding, and 1800 lbs. of good hay; whilst for every hundred pounds of hay less, she must receive 25 lbs. of grain more, or *vice versâ.*

As during the winter months, when the cows are confined to dry food, the butter loses its fine yellow colour, the defect is sought to be remedied by an admixture of colouring matter; and indeed a high colour in butter so much regulates its price in some markets (as in Spain and Portugal), that the export merchant insists on the desirable shade being imparted when it ceases to be natural. The best ingredients for this purpose are found to be, a mixture of annotta and turmeric, in the proportion of 5 oz. of the latter to 1 lb. of the former. Annotta, however, is so often adulterated that it may be well to mention some criteria by which to test its purity; a matter so much the more important, as butter is frequently much deteriorated by spurious annotta. When good it is neither very dry nor very damp, (in the latter case it has generally suffered a degree of putrefaction,) is of a bright and deep, but not dark red; should leave an orange shade when drawn along white paper, and possess a distinctly perceptible perfume, resembling that of violets. It is brought from South America, both in cakes and masses; the former (which is the best and dearest), are wrapped up in leaves, and weigh from 3 to 4 pounds each; black traversing veins indicate a careless preparation, and the too common admixture of red earth, or pounded brick, is easily detected by dissolving a piece in water, when the heavy ingredients will be precipitated. The mode of using this colouring is by boiling the annotta and turmeric in butter for half an hour (stirring frequently), and then, being strained through linen, it can be kept for use. When butter is to be coloured, the quantity of this preparation required (which practice alone can teach) is melted over the fire, and poured into a hollow made in the mass of fresh churned butter; then, by rapid stirring, intimately united with the butter immediately in contact with it, which, being then spread over the whole mass, is, together with the requisite portion of salt, carefully kneaded and worked through, until no particle remains more highly coloured than another; and when smaller portions have been thus coloured from day to day, before a cask can be filled, the whole must, before packing, be kneaded once more, that no disparity of shade may disfigure it.

The greater portion of the Holstein and Schleswig butter is bought up by the Hamburg merchants; though it is likewise sent in considerable quantities direct from Kiel and other ports to England, Copenhagen, and the West Indies.

There are three distinct breeds of cattle in the duchies: first, the native cow, which is by far the most common; it is middle-sized, not very long-legged, with fine head and horns, and moderately thick neck; the colour generally red or brown, though often yellow, black, and spotted. The cows of this breed decidedly yield more milk in proportion to the food they require,

than any other in these countries; and the district of Angeln is much sought to, as furnishing peculiarly fine specimens of the breed. Second, the marsh cows are much larger than the last mentioned, and generally of a red colour, large boned, and demanding luxuriant pasture; they are ill suited to the interior of the country, but thrive well in the rich marshy delta of the Elbe, giving, when in full milk, from 24 to 32, or even 40 quarts daily; but the return of butter is much smaller, and of inferior quality to that obtained from the Angeln cattle, which likewise maintain their superiority when fatted, by fineness of grain and flavour. Third, the Jutland cow, frequently met with in the northern parts of Schleswig, is fine in bone, rather lengthy than deep in body, and not generally to be termed long-legged. The commonest colours are grey or dun, and black, or either of these spotted with white; very seldom red or brown. This breed, being more distinguished for fattening easily than for milk, is consequently little prized for dairy purposes.*

The average quantity of milk obtained here from good stock may be estimated at from 2000 to 3000 quarts per annum, according to the food and care bestowed on them; the produce of which has been calculated in the following ratio:—every 100 lbs. of milk will give $3\frac{1}{4}$ lbs. of butter, 6 lbs. fresh cheese, 14 lbs. butter-milk (exclusive of the water added before and after churning), and $76\frac{3}{4}$ lbs. of whey; and, though the qualities of individual cows, the nature of their pasture or other food, and the atmospheric changes, occasion an almost endless variety of result, still it may be considered as a fair *average* that 15 quarts of milk are required for a pound of butter; for, although from some cows a pound may be obtained from 12 quarts, yet others, and even the same cows, at different seasons and with different food (such as beet or raw potatoes), will not produce a pound of butter from less than 17 or 18 quarts. On the whole, it is esteemed a fair return in these duchies when the average produce of the dairy amounts to 100 lbs. of butter and 150 lbs. of cheese per cow. When calves are fattened for the market, so much butter and cheese cannot be expected—from the generally received opinion that fine veal (and the veal of these countries is very fine) can only be secured by feeding with milk fresh from the cow; they

* As in other countries, so here, much prejudice exists against innovations: hence occasional attempts to introduce a better class of milch-cattle have been hitherto without success, and the most general opinion is that improvement is impossible. Experience forces me, however, to a very different conclusion; as, by crossing the best country cows (principally from Angeln) with Ayrshire bulls, I have obtained a class of stock so greatly improved in the second and third generation, both in carcase and milk, as to warrant the expectation that they will, in the fourth remove, bear comparison with genuine Ayrshires.

are usually fed for 10 or 12 weeks, and attain the weight of from 120 to 150 lbs. when slaughtered.

The calves reared as stock, as well as the great number of swine, form very important and lucrative items in the dairy-books.

Although horned cattle are not subject to so many diseases as sheep, they are yet exposed to many casualties; and it is to be lamented that their ailments have been much less studied scientifically than those of the horse. In addition to such every-day occurrences, it may be interesting to note the fatal and general epidemics to which they have been from time to time subject; especially as a scourge of this nature is now in progress through these countries, after having visited Poland, Prussia, Mecklenburg, France, and even England, in its capricious and unaccountable course. Historical records bear that, in 1647, a pulmonary epidemic broke out among the cattle of these duchies, of which many hundreds died. In 1744 another murrain spread over the herds, which destroyed many; and, in December, 1774, recurred, raging for eight years almost without intermission; during which it is computed that 150,000 either died or were necessarily sacrificed. It is now nearly two years since symptoms of a similar fatal malady showed themselves in Poland and the Prussian districts adjoining; and though every pains was taken to stem the infection, the epidemic has spread in the most irregular and inexplicable manner, sometimes overleaping estates and districts, sometimes proceeding in a direct line of march. Every possessor of a dairy was of course alarmed, and on the watch, and I no less so than my neighbours. During the whole of the past year, although the disease was on all sides of us, and actually in one of our own villages, within two English miles, none of our cows were affected till in November last, (when I had almost ceased to fear) I was roused by the intelligence that a cow was seized with foaming at the mouth, spasms, &c.; and before noon 10, before night 20, and within 3 days 240 head were infected! I had most fortunately read, shortly before, No. 4 of vol. iii., page 264, of the 'Farmer's Magazine' for October, 1839, and rigidly followed the system therein recommended. The result was most happy, as all the cattle, young and old, recovered within a very short time (with the exception of one cow, whose symptoms being slight, was neglected to be bled in the first stage, and died of inflammation of the lungs), without materially losing either milk or condition. The sheep too, to the number of 800, were affected in the foot, but by applying the ointment prescribed in the above cited article, they were relieved always in 48, and often in 24 hours—none died; and a few pigs which were attacked likewise recovered.

XLI.—*The Mode of Cultivation adopted on Stinchcombe Farm, by Mr. Dimmery.* By John Morton, Esq.

This farm consists of 200 acres of arable land, and although Mr. Dimmery, the tenant, rents another farm adjoining it, which consists of about 200 acres of meadow and pasture land, it is my intention to give an account of his mode of cultivating Stinchcombe farm only; the other land being used for fattening his stock of oxen, and producing hay and pasture for his sheep and working cattle. The arable land is situated on the south side of Stinchcombe Hill, which projects from the main body of the oolitic formation into the vale or low district of the county of Gloucester, and is much celebrated as affording a most beautiful and extensive view of the vales of Berkeley and Gloucester, the Severn, and the Bristol Channel. Around the south side of this hill the lower oolite assumes the form of a low terrace in front of the hill, and at least 300 feet below the top of it.

Stinchcombe farm is situated on this low terrace, and is about 150 feet above the level of the Severn. The soil of the upper part of this farm next the hill is composed of the *débris* of the oolitic rock, and is dry gravel, of little value, but all below this on the low terrace is of a good friable texture, partaking of the nature of the subsoil, or lower oolite on which it rests, and is well calculated for the production of barley and oats; it is neither too strong and adhesive for turnips and potatoes, nor too light and soft for the production of wheat under proper culture. This farm is about 16 miles from Gloucester, 25 from Bristol and Cheltenham, 4 from Berkeley, 3 from Wotton-under-edge, and 2 from Dursley.

ROTATION.

The production of the largest crops of the best edible kinds of potatoes, and at the least possible expense, being the principal object on this farm, Mr. Dimmery has found the course of cropping which he has adopted, after an experience of upwards of 40 years, to answer the best. The first year he takes turnips, the second year potatoes, and the third and last year of the course he takes wheat. About one-third part of the wheat stubble is sown to winter vetches, which are eaten off the ground by sheep, and as the ground is cleared it is prepared for a late crop of turnips, so that the whole of the land which was wheat is sown to turnips the following year. The turnips are all consumed by sheep folded on the ground in the usual way. After the turnips potatoes are planted on the whole the next year. To this rotation most farmers would object, as a crop of barley might be taken between the turnips and potatoes, and also from an absence of a crop of

clover in the course; but it will be seen in the detail, that in this course for 12 years, there are 4 crops of wheat and 4 crops of potatoes, both of which are the most valuable articles a farmer can produce from the soil, and only 4 preparing or fallow crops. The land is always kept in the best state of culture, and its productive power is never diminished by any of the crops which are taken, nor does it require in any one year any additional labour to clean it from weeds. The expense, too, of this course of cropping for 12 years is perhaps not more than that of the best system adopted by our most scientific practical agriculturists, in whose course alternate crops of corn and green crops prevail; by this course, also, a greater quantity of vegetable and animal food for the use of mankind is produced than can be grown in this climate upon soil of the same quality under different management.

VETCHES.

Soon after the wheat is harvested the stubble is cut and carted off the ground before the potato harvest is begun. About 20 acres, or one-third part of the wheat stubble, is prepared for winter vetches. One ploughing only is necessary, and about 3 bushels of vetches to the acre are sown broad-cast, and the ground is well harrowed to cover the seed. The cost of the seed, and the expense of once ploughing, and of two or three single turns of the heavy harrows are the whole expenses attending the cultivation of this crop; nothing more is required beyond the keeping the field shut up from stock during the winter and spring months. Mr. Dimmery thinks that the land very soon gets tired of growing vetches, and as he therefore takes this crop on only one-third part of the land which is intended for turnips, and his rotation being only a three-course shift, the portion of the land which is required for this crop does not come round for vetches oftener than once in nine years. The value of the crop of vetches, which these 20 acres produce as food for sheep, is very considerable, and can easily be ascertained from the amount of stock which it keeps. About 340 ewes, 340 lambs, and 170 wethers are generally put on this crop about the second week of May, and are kept upon it till the first of July, or till the crop is all consumed. This amounts to about 7 weeks' keep for a flock of 850 sheep, or at the rate of about 5 or 6 sheep per acre per annum, which may be said to be free of all expense beyond the cost of the seed, as the land does not undergo more expense in preparing it for the turnip crop than if it had not been sown to vetches, and the manure left by the sheep, with what additional dung can be procured, always produces a good crop of late turnips.

TURNIPS.

As soon as the wheat stubble is all carried off the land, the sheep are brought from the pasture land where they are fed by day, and folded on the land intended for turnips. Mr. Dimmery prefers folding the sheep on the land before it is ploughed, as they lie much drier on it. As soon as the teams can be spared, either before, during, or after the potato harvest, that part of the turnip break intended to receive the stable-yard manure is ploughed, and that part which is folded by the sheep is ploughed as it becomes ready. The second ploughing is performed early in spring, generally in February and the early part of March: there is nothing particular in the preparation for this crop, except that from the shortness of the rotation and the two cleaning crops in it, the land never requires to be ploughed for the purpose of eradicating weeds, but only for pulverizing the soil and bringing it into a good tilth. For this purpose the roller is frequently used after the land has been ploughed, and before the drags are applied the land is always rolled to break down or bruise the furrows that they may have a greater effect, and get down to the bottom of the furrows; and when the land drags up in lumps it is again rolled before the second dragging. This is the most effectual method of completely pulverizing the soil; the harrow is very seldom used in effecting it; indeed it is very seldom used at all on this farm, except in harrowing in the turnip seed. When the land is properly prepared for the crop, all the dung that can be collected is carted on it, and is ploughed in with the last furrow; that for Swedish turnips in May and June, and for the other in June and July, and that which was in vetches as soon as the land can be got ready after they have been consumed by sheep. The whole is generally finished about the middle of July. The turnip seed is always sown broad-cast on this farm. The whole of the crop is consumed by sheep on the ground, which are folded in the usual way, receiving along with the turnips a sufficient quantity of hay supplied from the grass farm. The sheep are generally put on the turnips in the end of October, and are kept on them till near the end of the following April; all the land is either manured by the fold, the dung carted from the yard, or by the consumption of the crop of vetches by the sheep. The turnips produced after the vetches are generally the greatest crop. Mr. Dimmery frequently sows swedes after them; indeed he prefers swedes to the others, and it is only for early consumption that he sows the common sorts at all. He only hoes the crop once, which is carefully performed, so as to separate the plants to a proper distance. He does not require to hoe for the purpose of destroying the weeds. The expense of this crop may be reck-

oned at three ploughings, two rollings, five draggings, and two harrowings, besides carting all the manure raised on the farm. The land being always clean, the crop of turnips never fails. They are universally a good crop; the 66 acres are equal to keep from 16 to 20 sheep per acre, from the end of October to the end of April, which is at the rate of 8 to 10 per acre per annum.

CABBAGE PLANTS.

There are generally between 2 and 3 acres of the turnip break, or field, sown with cabbage seed for plants for the autumn and following spring; the preparation for which is the same as for turnips, with the exception of an additional ploughing and harrowing being given. The seed is sown in the month of August, and the plants are pulled to supply the demand. Mr. Dimmery raises his own cabbage seed, and therefore can always warrant his plants to be the best of their kind; he only raises two sorts, the early York and broad Battersea. The seed of these are mixed together before sowing, and in drawing them for sale they can easily be distinguished; they are sold from 8*d.* to 1*s.* per 100. From 150,000 to 200,000 have been sold in a season. All those which remain on the ground in May are eaten off by the sheep, and the land comes in its course for potatoes. Although the return from this crop is great, yet the expence of weeding and pulling the crop, tying them up in bundles of 60 each, and carrying them to market, is also great. Mr. Dimmery gives an allowance to those who retail them, and thus saves all the expense attending marketing. His kinds are so well known that the most of them are sold on the ground to people who come for them: they are pulled up by men and women, who tie them up in bundles as they are wanted.

POTATO CULTURE.

Preparing the Ground.—As soon as the sheep have consumed the turnips off a considerable part of the field, the land is ploughed, to cover the manure left on the surface by the sheep, and to prevent it from being either washed away by the rains or evaporated by drought. This is performed by the ox teams, the horses being at this time of the year employed in hauling out the potatoes to market and other work on the road. After this ploughing, the land remains till the end of March or the beginning of April. If there has been frost to pulverise the surface, another ploughing is not necessary, and the heavy drags, loaded with blocks of timber, and worked with six oxen, go over the land twice to a place, loosening the whole of the furrow slice. The land is then rolled with a heavy roller, to bruise all the lumps brought up by the drags, after which it is again dragged in an opposite direction.

If the land works well, it will do for planting after being again rolled; but if there has been no frost, or if the winter and spring have been wet, and the land has got soured by wet, or baked hard by drought, after the first ploughing, it is then rolled by the heavy roller, to crush the surface, that the drags which immediately follow may have a greater effect and get deeper into the ground. I would here observe that Mr. Dimmery has a perfect knowledge of the use of the roller as a most efficient implement in pulverising the soil. I have never seen the roller so much used on any farm as on this. The heavy drags, loaded as before described, follow the roller; the land is again rolled, to crush the clods raised by the drags, and the field is again dragged in an opposite direction; it is again rolled the third time, and is ploughed again, if necessary, and rolled, dragged, and rolled, till the whole of the furrow slice is so completely loosened and pulverised as to be easily formed into drills by a hoe. The harrows are never used on this farm, for there are no weeds to shake out, and Mr. Dimmery says his object is not so much to reduce the surface as to loosen the whole of the soil to the depth at which it was ploughed, and the greater this depth the better it is for raising a crop of potatoes.

Seed.—The varieties selected for cultivation are those which, from long experience, have been found to produce, not only good crops, but also potatoes of a quality and flavour suited to the tastes of those who consume them. Four kinds are cultivated for human food,—the mossys, an early, round, white potato, of good flavour, rather yellowish within. Of this sort a small quantity only are planted; they are ready about the end of July. The round black, or black skin, very white within, mealy, and of excellent flavour, keeps good from October till the end of May; and the magpie, or red apple, which keeps the longest of any, is of excellent flavour and very mealy. This last sort will keep good till the mossys, or early potatoes, are ready the year following. Besides these, the white flat is a very prolific, mealy potato, preferred to all others by the inhabitants of Gloucester. The greatest breadth is planted with the black skins and red apples, and these are planted on the best land, the white flats on the poorest soil. In selecting the seed, great care is taken to pick out those of the true kind for planting; the seed or sets are taken from the middle sized potatoes, and they are generally cut in two, the principal object to be obtained being the greatest quantity of good edible potatoes, not of the largest size, otherwise the largest potatoes would be selected for seed, and the tops of these only cut off for sets. It has been found that the tops of large potatoes produce the greatest crops of the largest sized potatoes. Many people think it necessary to change their seed every three or four

years, at least, and particularly their potatoes, as this plant, they say, degenerates more than any other; the seed potato on this farm has never been changed, except once about 30 years ago, when the crop was blighted by some cause, which induced a change at that time; Mr. Dimmery then got new seed from Dumfries, in Scotland, and these he has continued to cultivate without any symptoms of degeneration or deficiency of crop.

Planting.—Mr. Dimmery has found by long experience that early planting is attended with great risk, not only from the frost injuring the young shoots when they come above ground, which being full of sap are destroyed by the slightest frost (the potato being the first of all cultivated plants that are injured in that way), and the check which they thus receive to their growth is most injurious to the crop, reducing it in quantity from 10 to 20 per cent., but because that when the potatoes are early planted, the spring rains solidify the earth around the plants, and prevent the fibres from running in the earth, or create a much greater expence in hacking or hoeing the ground, to give the degree of looseness necessary to secure a full crop. Early planting, therefore, is always avoided on these accounts. This operation begins on this farm about the 20th of April for the early, and the 20th of May for the late sorts (the ground being previously well pulverised and loosened to the depth to which it has been ploughed). The ridges being a perch in width, drills are formed across them, and the operation is performed in this way;—a man with a heavy triangular hoe, about 4 lbs. in weight, something in the shape of a mason's trowel, but considerably broader, with a handle about 2½ feet long, begins on one side of a ridge, by making a hollow groove or drill across the whole of its width, till he comes to the other furrow. This he does by repeated strokes of the hoe into the earth, moving backwards after each stroke, drawing the hoe and the earth with him, and then lifting the hoe to make a fresh stroke and a fresh movement backwards. This operation is repeated till he arrives quite across the ridge to the furrow between the ridge he is operating upon and the one adjoining it; he then turns about, and makes a fresh drill at the distance of 22 inches from the one last made, till he comes to the side of the ridge where he first began, and proceeds in this way till the whole ridge is formed into drills, at the distance of 22 inches apart, and about 6 inches deep from the edge of the earth raised up by the operation, not, however, more than 3 inches into the ground, about 6 inches wide at the top and about 2 inches at the bottom. No line is used to make the drills straight; the workman, from long practice, performs the work without one, and succeeds in making them not only straight, but at equal distances. This work, it must be observed, requires considerable force. The weight of the hoe,

and the shortness of the handle, force the person working with it to use it in such a position of body as enables him readily to employ the whole of his strength to the best advantage. His body is bent forward, the handle of the hoe between his legs, and his labour is very much like that of a carpenter hewing a spar of wood with an adze, only he makes the strokes, not so much by lifting the hoe high above the ground, as by pressing it into the earth by the strength of his arms, added to the weight of his body. As the workman is proceeding with his work on this ridge, others are proceeding in the same way with the other ridges adjoining, but, instead of forming the drills in a straight line across all the ridges, each of them is designedly made to begin and terminate in the middle of the space between the drills on the ridges on either side of it, and this plan is universally adhered to throughout all the field. This may be thought a slovenly and irregular mode of proceeding with the work, and certainly it does appear so; for the field would look much better if the rows were in a continued straight line across the whole of it; but when the reason for adopting this mode of proceeding is explained, it will be evident that Mr. Dimmery has the best of all reasons for using it, viz., the obtaining by it an increase of produce. Every one, at all acquainted with agriculture or gardening, must have observed that potatoes, or any other plants, produce a greater crop when separated from each other by a considerable distance than when they are planted near each other, and that the outside plants of a row are more productive than any other plant in the row, every other circumstance being the same. Having observed this to be universally the case, Mr. Dimmery has adopted this plan of terminating the rows of each ridge precisely in the middle of the space between the rows of the adjoining ridges, and by this mode of proceeding he gets an increase of upwards of 5 per cent. more than if the rows were in a continued straight line across the whole field. The drills being formed, as above described, a man follows with a basket of soot, and sows it in the bottom and sides of the drills with his hand, walking up the middle of the ridge, and throwing first a handful of soot to the right and then a handful to the left, at the rate of about 25 bushels to the acre. The potato sets are then planted by women and boys, in the bottom of the drills, 10 inches apart, and as the seed is deposited in the drills a man follows with a hoe, about 8 inches wide, and covers the seed by drawing the earth from the space between the drills, covering the potatoes which are planted by raising the earth higher over them than it is between them. The earth being very loose, this is very easily accomplished. By this mode of covering, it will be perceived that the whole of the soot does not come in contact with the seed, but is so placed as to give nourishment to

the young roots. The whole of these operations of forming the drills, sowing the soot, planting the seed, and covering the potatoes, are going on at the same time. I have seen 8 adjoining ridges in progress at the same time; 8 men with triangular hoes making drills, 1 man to each ridge; 2 men sowing soot, 4 ridges to each; 8 women, 3 rows behind them, planting the seed; 2 men or boys carrying the potatoes to the women, and 8 men covering them in; 2 carts hauling the potatoes from the barn, where the sets are prepared; and 2 women filling the carts from the barn: thus 32 people and 4 horses are in constant and full employment, until the whole crop is put into the ground. The head lands are planted across in the same way as the other ridges, and the whole of the operation of planting is finished, and the field shut up till the plants begin to appear above ground. The forming of the drills, sowing the soot, planting and covering the seed, only cost 6*s.* per acre, exclusive of cutting the sets, carting them, and carrying them to the planter, and of carting the soot. This seems certainly very little, but it must be recollected that the land is very loose, smooth, and finely pulverised; the price is the same now as it was during the war; there has been no alteration for the last forty years. To this, however, should be added the price of 3 quarts of beer to the men, and 3 pints to each woman and boy per day; and the wages which the men earn are 9*s.*, the women 4*s.* 6*d.*, and the boys 4*s.* per week: 16 men making the drills and covering the seed, and 8 women planting the seed, can easily finish 5 acres a-day with 45 sacks of seed.

Hoeing.—Hoeing (or *hacking,* as it is here called) is performed by the same peaked hoe which has been described, and used in forming the drills. As soon as the plants begin to show themselves above ground, this operation is begun, and is performed by men working with it in the same position as when forming the drills, only he is now under the necessity of lifting it up and making repeated strokes with it into the ground, thereby moving and loosening all the ground between the rows of plants, and also between the plants in the rows, taking care not to disturb or injure the plants; this work is performed by men at the rate of 8*s.* per acre, with 3 quarts of beer per day to each man.

Earthing up the Potatoes.—When the plants get from 4 to 5 inches above the ground, the earth is drawn up about them on both sides of the row. This is performed with a hoe about 8 inches wide; the plants by this operation are nearly covered, and it is found that the higher the earth is drawn up about the plants, the greater is the produce; it is therefore necessary to be particular in the performance of this work, as much depends on its being done properly. None of the plants should be covered, as this checks their growth, and gives their neighbours the start of them.

In performing this part of the work, it must be observed that the earth is drawn up around the ends of each row, which projects in between the rows of the adjoining ridge, and no loose earth is left either in the furrows between the ridges or between the drills. In performing the whole of this operation, the object is to lay as much loose earth close round the stem of the potato as possible, that the runners on which the potatoes grow may not be obstructed in their growth in any direction; the expense of thus earthing up the potato is at the rate of 6*s.* per acre, with 3 quarts of beer a-day to each man. The field is now shut up till the time of harvesting the crop.

Harvesting, or taking up the crop.—This work is generally begun about the beginning or end of October, except the early sort, which are taken up to supply the demand, or whenever the haulm or leaves of the potato have withered and begun to decay. The first part of the process is to pull up with the hand the whole of the haulm or stalks of the potatoes, and lay them in parcels on the ground; any potatoes that come up with the stems in this operation are shaken out upon the ground; some hands begin this part of the business first, to clear the ground for the diggers to follow. This work is always begun at the lowest part of the field. The potatoes are all taken up with the spade, and this is performed by pressing in the spade with the hands (the foot never being used as in digging) behind a portion of the row, and scattering the earth and the potatoes he lifts up before him; this he does by turning the spade as he spreads the whole several feet from him every time he lifts a fresh parcel of the drills, and if he sees any potatoes remain in the ground they are twitched out by a sharp turn with one of the corners of the spade. Women and boys are employed in picking up the potatoes into baskets as they are thrown out upon the surface, and 1 or 2 men emptying the baskets into the cart or waggon, which takes them off the field to the storing-place. There is the same method adopted in taking up the crop as there is in planting it; there are 2 men to each ridge, with spades to lift the potatoes out of the earth, and spread them before them on the ground which they have already cleared. Each man works at his own side of the drill, 2 women or boys with a basket picking up the potatoes as they are thrown, besides a man for every four ridges, to empty the baskets, as they are full, into the carts. That the sorts of potatoes may be kept free from mixture, Mr. Dimmery gives to those employed all that run from their kinds, and therefore those employed on every ridge have a bag, into which they put all the produce of those which are not of the true sort, and which is divided every night amongst those employed. From 40 to 50 people are employed in this work while it lasts; it is generally accomplished in about 3 or 4 weeks,

if the weather is favourable. The men receive 9*s*., the women 4*s*. 6*d*., and the boys 4*s*. each, per week, with an allowance of beer. The whole expense of harvesting this crop, per acre, including the expense of the harvest-home, when a supper and plenty of beer and cider are given to all the people who have been employed in the work, has in no year exceeded 21*s*. per acre. The average produce of this crop may be stated at 60 sacks, of 280 lbs. per acre, of good, saleable, edible potatoes, of the magpie or red apple; 70 of the round black skins and mossys; and of the white flats about 80 sacks; besides the broken and small, and those kept for seed, which amount to about 20 sacks per acre more.* The value of this crop, like everything else, is regulated by the demand; the price being regulated in some measure by the price of wheat, being about the same for a sack of potatoes, weighing 280 lbs., as the price of a bushel of wheat. As to the relative value of the different kinds, Mr. Dimmery reckons that when the magpie or red apple and early potatoes sell at 8*s*., the black skins and white flats are worth 6*s*. per sack. The common mode of raising a crop of potatoes is by applying a large quantity of dung in contact with the seed or sets. This plan has been suspected of producing a disagreeable flavour in the potato; as, however, we have said before, Mr. Dimmery's object being to produce the greatest quantity of good-flavoured, edible potatoes, he has adopted the mode of applying all the dung to the turnip crop, and as this crop is consumed by the sheep, their dung is dropped regularly over the whole surface, and is intimately mixed with it by the succeeding preparation. The whole of the staple, to the depth of the furrow slice, is thus enriched, not only with all the dung applied to the turnips, but also with the produce of the whole turnip crop consumed by the sheep, without any portion of the manure coming in contact with the plant.

Storing the crop.—The kinds which are for immediate use are put into a large house or barn for the purpose, and the carts which fetch them from the field are put back into it and emptied; these are thrown together in parcels, taking care not to mix the several kinds; each are kept apart by straw, supported by boards or hurdles, and are easily taken out and carried to market, being only covered with straw. In the time of continued frosts, a fire is lighted in the house in the after-part of the day, which prevents the frost from injuring the potatoes. Those which are to be kept till the spring and summer, and these are the most valuable kinds,

* That is an average (including chats and seed) of 90 sacks; equal to 11¼ tons per acre; which is a very large produce, particularly if it be considered that the sorts planted are of "edible potatoes" for the table, and consequently not of the size of those usually grown for the feeding of cattle.—F. Burke.

are stored in the corner of a field, near to the road, and generally in the field which is to be in potatoes next year; they are put into heaps of not more than 20 sacks or 2½ tons each. This size is not so much for the conveniency of moving one of these heaps at a time in a waggon, but it is found that they keep much better in heaps of this size than when they are larger; for when there is a great quantity put together they are apt to heat and spoil, and many of them rot. To prevent this, in the barn where a great quantity are put together, it is found necessary to separate them into small parcels with hurdles and straw, and turn them over now and then. These heaps are formed on the surface of the ground; the potatoes are piled up in the form of the roof of a house, they are then covered with straw, and about 2 feet from the potatoes, all around, a trench is dug, the earth taken from which is placed upon the straw about 8 inches thick, and beat close with the back of the spade; the whole of the surface of these heaps are then covered with the potato-haulm which was brought from the field, to keep out the frost and rain. The expense of covering the heaps with earth is 1*s.* 6*d.* each. I have seen 100 of these heaps in the corner of a field, so close together that the whole of the surface of the soil, to the depth of the furrow, has been moved between them, to cover them.

Preparing Potatoes for Market.—In preparing the potatoes for the market, iron sieves, having meshes about 1 inch square, are used for separating the small potatoes, and carrying off any earth that may adhere to those which do not pass through the sieve. Wooden shovels, such as are used for turning malt, are used, and also iron shovels, made of round rods of iron, welded in the front to a flat piece of iron, forming the mouth, and on the back to a stronger piece of iron, to which the handle is fastened by a hose; these round rods are at the distance of about an inch from each other: the object of thus forming a shovel is not only to make a large, light, efficient instrument, but to allow the loose earth to drop through it, as the potatoes are l fted with it from the berry or barn into the sieve. When the potatoes are to be prepared for the market, a sufficient number of hands are employed; the waggon is put in a proper place, and a man, having a sieve in his hand, a shovel full is put into it by another person, and he gives it two or three turns, and then empties it into a basket, which is a measure equal to a third part of a sack. Any broken or spoiled potatoes are picked out of the basket, during the time they are filling it from the sieve, by a boy, and when the basket is full a man empties it into a waggon; the small potatoes which go through the meshes of the sieve are, from time to time, taken by a woman or boy, and separated from any stones or earth, and put into a place by themselves, either for seed or to be sold for the pigs.

A man with a shovel, and 2 men with sieves, a boy, and a woman, are employed in thus preparing the potatoes from one pit at a time. The potatoes are thus prepared for the market: the berries are never opened except for the purpose of taking them to market, unless in the spring, when they begin to sprout, when they are turned over in the same way as already described. When they are prepared for the market, several turns more of the sieve is given to them, for the purpose of bruising the sprouts. The expense of this method of turning the potatoes is very trifling; 12 persons, men and women, can easily do 3 berries, or 60 sacks, in a day, or 4*s.* 6*d.* each pit of 20 sacks.

WHEAT.

As soon as the potatoes are all taken up, the field is dragged over once in the direction of the ridges; the edges of the drills, which may have been neglected by the spade, in taking up the potatoes, are by this operation levelled, and any potato-haulm that remains is gathered up and carried off the ground; the wheat is then sown on the surface after the drags, and ploughed in: this is preferred to the common way of ploughing the land first and harrowing in the seed after. Mr. Dimmery's reason for this is, that the land, after the potato crop, is left so loose that it is necessary to get a good clod on the surface, if possible. By this plan the firm earth at the side of the potato-drills is lifted up by the plough, and left on the surface. A team easily ploughs in an acre a-day, and a man and a boy follow with spades, to clean out the furrows, and level any of the ground that may be left uneven. The quantity of seed is from 3½ to 4 bushels per acre, according to the time of sowing; the later it is sown the more seed is required. Mr. Dimmery thinks that farmers lose much by not putting seed enough into the ground. In the spring, about the month of March, the wheat receives a dressing of soot, at the rate of from 25 to 30 bushels per acre. The crop is reaped and stored in the usual way in the rick yard; the average crop is from 28 to 32 bushels per acre, but he has often had 40 bushels per acre; it is always clean and of good quality; there never was any smut seen on this farm; the reason, Mr. Dimmery says, is because he always sows *newly-threshed seed, the produce of the previous year.* The expense of preparing the land for this crop is only once ploughing, 4 bushels of seed, and 12*s.* to 15*s.* worth of soot (24 or 30 bushels), so that in the system adopted on this farm, the crop of wheat, which farmers in general reckon the most valuable of all their produce, and for which all their previous course is only a preparation, really costs Mr. Dimmery nothing, nor is he in any anxiety about the preparation. The crop of potatoes being his principal object, by the plan which is here

adopted the land is left in the best state that such land can be left in for receiving the seed. All the wheat-straw is made into haulm (as it is called), for thatch, the value of it depending on the separate straws being kept whole and sound; the wheat is not thrashed in the common way, in the straw, as this would injure it for thatch, but it is prepared in the following way;—a cord is made fast in some elevated part of the barn, upon the wall or in one of the great doors, and a sheaf of the wheat in the straw is parted into as many parcels as a man can grasp with both his hands; he then places this parcel with the ears on the floor, holding them loosely in his hand, lifting up the parcel repeatedly, and letting them all drop to the floor, so as to get the ears all even together; when he has effected this, he then takes hold of the parcel, directly below the ears of corn, and takes it to the cord, and fastens it around close to the ears by a single hitch; he then, with a long-toothed comb, with a single handle like a rake, combs all the straw below the hitch, to get out any ears of wheat that may still remain, and also all the broken straw out of the parcel, searching for them by spreading out the straw with his hands; the parcel is then taken from the cord to a separate place on the floor, and the ears of wheat are cut off from the straw; the straw is then put in a place detached from the ears, until a quantity sufficient has been collected to make a bundle. The bundle is tied up with a strong band made of straw; each of the bundles is about 40 inches in circumference, and weighs about 30 lbs.; they are sold for 10*s.* per dozen. The expense of making the haulm is 1*s.* 9*d.* per dozen, and of thrashing out the wheat from the ears is 4*d.* per bushel. Every day's work is finished by carrying out the bundles, and thrashing out the wheat from the ears that have been cut off, and cleaning the floor for the next day's labour. There is an average of 2 bundles of haulm for every bushel of wheat, besides the broken straw and ears, which may in general be equal to 25 or 30 lbs. per bushel more; thus about 60 bundles of haulm is made from the straw of each acre, producing 2*l.* 10*s.* per acre for the straw, besides the price received for the wheat, which varies according to the demand.

MANURE.

The quantity of dung raised on this farm from the working cattle and the pigs, which consume the refuse potatoes, is not great for the extent of land in arable culture, particularly as nearly all the straw grown on the land is sold for thatch. To fill up this deficiency, Mr. Dimmery used to buy all the dung he could, and whenever his teams went out with a load of potatoes they brought home a load of dung; but this he has discontinued for nearly 30 years, and, in place of farm-yard dung, he has found a most

valuable substitute in soot, the carriage of which is not one-twentieth part of the expense of hauling the dung he used to buy. Soot, therefore, is an object of great importance to him, and as the carriage of it is light, he fetches soot on his return when he takes potatoes to market, either from Gloucester or Bristol, both of which cities he supplies; he has found that there is a considerable difference in the quality of soot, and this difference depends, he says, principally, if not entirely, on the length of the chimney producing it; the chimneys of Bristol, being much longer than those of Gloucester, the soot of the former city is of a much better quality than that of the latter. The general price of soot is 6*d.* per bushel at Gloucester, 120 bushels cost 60*s.*, while he pays 5*l.* for 140 bushels at Bristol, and yet he prefers the latter as the best bargain. He has lately sent to Cheltenham for it, because he gets it at a lower price, although he has to haul it a distance of nearly 25 miles. The quantity of soot used on this farm is upwards of 3,000 bushels a-year, one-half of which is applied to the potato and the other to the wheat crop; it is seldom that it is applied to the whole extent of either of these crops, but wherever it is thought the application would be advantageous, the expense is never saved. As there is a considerable variety in the quality of the ground, some parts of it receive a much greater quantity of soot than others, and this whether the crop is wheat or potatoes. We have not been able to obtain from Mr. Dimmery any idea of how the soot acts in producing such effects, as it evidently does, both on the potato and wheat crop: the effect of it is particularly evident on the wheat; for, however sickly it looks in the spring, its colour and the vigour of its growth is changed in a few days after it has been applied. Soot is evidently a very powerful manure; and a portion of its charcoal is in a state in which it is capable of being rendered soluble by the action of oxygen and water; it affords ammoniacal salts by distillation; the effects, therefore, produced by it on the growth of vegetables may be owing both to the ammonia and the solution of the carbon of which it is composed; but the experiments made by Mr. Malcolm with soot, recorded in the first volume of the British Husbandry, p. 337, are most convincing, as proofs of the superior value of soot as a manure.

ESTABLISHMENT.

Mr. Dimmery directs and attends to the performance of all the operations of the farm that are going on; although there is a greater variety of labour in the system which he has adopted than there is on farms in general, the whole of the several branches are so distinct and separate from each other, that one is finished before it is time for the other to be begun. When there

are a number of labourers employed together, it is of great importance to have the faculty of order; with this power the whole can easily be arranged, so that every one shall perform his own work without interfering with those that are near him. The industry of each thus acts as a stimulus on the others, instead of retarding the progress of their labours. There are constantly employed on this farm 8 men and 8 boys, whose business it is to work the teams of oxen and horses; there is also a shepherd, whose business it is to attend to the sheep, besides those employed in planting, harvesting, and marketing the potato crop, and those employed in harvesting and thrashing the wheat crop. The working cattle are 12 oxen and 4 horses, with a saddle horse; only 2 oxen are put to a plough, but a boy is employed to drive them, besides a man to hold the plough; thus 6 ox and 2 horse ploughs can be worked at the same time; this is strength more than equal for all the work that is required in cultivating these 200 acres of arable land. There are always 4 of the oxen turned off every year to fatten, and 4 young ones brought to supply their place in the team. These are all of the Hereford breed, as they are not only good workers, but also good feeders. In the winter, spring, and summer, the 4 horses are generally employed in hauling the potatoes to market, and fetching soot home; but as they cannot perform the whole of this labour, Mr. Dimmery hires teams to assist, at from 16*s.* to 1*l.* a day, for a waggon and team of 4 horses. This costs him after the rate of 8*d.* per sack for hauling the potatoes to market. During the time of preparing his land, either for the potatoes or turnips, he generally hires teams to carry out all the potatoes which the market demands.

STOCK.

Besides the 12 oxen and 5 horses employed in cultivating the farm, there is a flock of sheep, consisting of 340 ewes, 340 lambs, and 170 wethers; the old ewes and wethers being generally sold off about Michaelmas, in good store condition, or fatted for the butcher. The whole of these sheep are kept on the arable land, from the middle of October, on turnips, till the middle of April, or sometimes till the middle of May, when they are put to the vetches, which will keep them till the middle of July. If the vetches are not ready for them when they have finished the turnips, they are taken to the grass farm for a short time, and after the vetches are all consumed they again return to the grass land, and are fed on the lattermath till the end of October. There are also a number of pigs kept to consume all the offal potatoes; the number is very uncertain, depending on the quantity of small or broken potatoes which cannot be sold; for it is a rule with Mr. Dimmery to dispose of all the offal potatoes, if

there be a demand for them, instead of buying pigs to consume them. . . . .

On examining into the merits of the system adopted by Mr. Dimmery, we are struck with the shortness of the rotation, the absence of clover and all other green crops as food for sheep, except turnips, the succession of two fallow crops, and the sale of nearly all the straw, which reduces the quantity of vegetable and animal manure to be returned to the soil. It is said that when a crop is repeated in too rapid succession, the soil soon gets tired of it, and the produce of it is gradually diminished: this we know to be the case in some instances, on certain soils. Saintfoin, it is said, will not produce so good a crop on any land the second, as the first time it was sown; and it not only diminishes in quantity on every repetition, but it will not remain so many years in the ground; and some farmers say that there ought to be a period of 30 years, at least, before it should be again sown on the same land. Clover seldom succeeds on sandy loam, or thin hashy land, when often repeated; and at the distance of 4 years it frequently fails. Turnips, also, on light sandy soil, when repeated at short intervals, grow fingery and of little value. I think, however, there may be some other reason for these failures, as a good coat of clay or chalk on the Norfolk and Suffolk land, when it gets tired of turnips, and produces them fingery, has the effect of giving to the land the power of again producing good crops of this root, and at the same intervals, viz., once in four years, when land is well calculated for the production of wheat, it is very evident that it will continue to produce this crop for a much longer period than land that is not fitted for its production. I have seen on good strong wheat and bean land, 10 good crops of wheat produced in 20 years, with alternate crops of beans, clover, and summer fallow; the last crop much better than the first, and the land become more fertile and productive by this culture than before; but we could not expect to have an increasing return if we were to adopt this mode of cropping with wheat on light sandy soil. Much, therefore, depends on the kind of land, whether it is best calculated for the growth of the particular crop that is grown on it. I have before said, that the soil of Stinchcombe farm is neither too strong for the production of turnips and potatoes, nor too light for the growth of wheat. Although the soil be well fitted for the rotation adopted, there may be something in Mr. Dimmery's peculiar method of working the land, in preparing it for the several crops, as well as in this succession of crops, which may prevent them from being injured by their rapid succession. I have been in the habit of riding over the farm ten or twelve times a year for the last twenty-five years, and I can safely say that, instead of a diminution in the crops there has been an increase, not only in the yearly return of each of the

three crops grown, but also in the quality and fertility of the soil. It is universally allowed that the principal merit of the Norfolk system is the quantity of food it produces for sheep: it is a maxim in agriculture, that the greater the number of sheep that can be maintained on an arable farm, the greater will be the produce of corn per acre; this is evident to every agriculturist, as it is not only the cheapest but the most profitable mode of bringing land into good heart. "If I can only get a good crop of turnips, I shall be sure of a good crop of barley and clover, and then the land will be in excellent condition for wheat," is the language of every farmer when he sets about to clean his land in good earnest, and prepare it for turnips. In this rotation there is only one-third part of the land that produces turnips as food for sheep; and if we place this crop in juxta-position with the turnip crop, in the Norfolk four-field system, it will not appear to disadvantage, nor will there be a less quantity of food for sheep produced on this three-field than there is on the four-field shift, if the clover on the latter is mown for hay, and not consumed green on the land by stock; for we must remember that there are four crops of turnips in twelve years in the three-course shift, while there are only three crops of turnips in the same period in the Norfolk system. The quantity of manure, therefore, which the sheep leaves while feeding off the four crops of turnips during the twelve years, is at least one-fourth more than that which can be left by the sheep while consuming the turnips produced by the Norfolk system in the same period. It is said that one acre of land is well manured by 200 sheep, when folded on it one week, or by 1400 in one day. Now, if we reckon an acre of turnips to produce food sufficient for 12 sheep for 6 months, we shall have the manure of upwards of 2000 sheep for one day left on every acre that was in turnips, and this dressing repeated every three years, besides the manure of the sheep while consuming the 20 acres of vetches, which is nearly equal to that of the turnips. This, I think, is at least equal to, if not a great deal more than all the manure that can be produced on a farm of land of the same quality under the four-field shift, when no manure is purchased. The succession of two fallow crops is against all precedent in the agricultural world, although a succession of two corn crops is too often adopted in every county of the kingdom, to the injury not only of the farmer, but also of the land; and it is the greatest difficulty to get the farmers to give up this, for the alternate system of cropping. To propose potatoes as the most profitable crop after turnips would be reckoned the height of madness, but when we consider the potato as the most valuable crop that can be produced, this must be a reason sufficient for adopting a system that produces the price of 70 or 80 sacks of potatoes, at

the same time that the land is receiving the best preparation for a crop of wheat the year following. It is very evident that this course of cropping must keep the land perfectly clean and free from weeds, both annual and perennial; the perfect fallow given to the turnips, followed by the preparation for the potatoes, with the complete culture given to this crop, must eradicate every weed from the soil. All the energy of the soil, all the enriching and vivifying quality of the dung, the fold and the soot, which is yearly applied, has its full effects on the crops which are cultivated, instead of being dissipated by the production of weeds. We must acknowledge that nearly the whole of the produce being carried off instead of being consumed on the farm, and converted into manure to be again returned to it, seems, at the first view, to be the most objectionable part of the whole system; but when we examine the whole of the detail, and find that, instead of a dressing of from 10 to 12 cart-loads of dung once in four years, which is all our best farmers can produce, that Mr. Dimmery gives first a dressing of soot to the potato crop, repeats it again the following spring to the crop of wheat; that all the manure he can raise is bestowed for the production of turnips the year after; and that in fact his land is manured every year instead of only once in four; that besides the quantity of manure left by the sheep four years out of twelve, he buys yearly from 80*l.* to 100*l.* worth of soot as manure for his land, we cannot help feeling satisfied that there is much more than a compensation for the loss of the straw and the potatoes taken off the land. Indeed, from our observation of this management for so many years, we are convinced that the system adopted is one that ought to be well considered by every farmer in the kingdom, because, that by it the land not only increases yearly in its productiveness, but that it also produces more vegetable and animal food for man, and at less expence too, than is raised by any other system.

The quantity of human food raised on this farm, and the number of families it will yearly maintain, may be reckoned thus: —We have before stated the vetches to be equal to the keep of 5 sheep per acre per annum, and the turnips equal to the keep of at least 8 sheep for the same period; these two crops will be equal to 4 ewes, 4 lambs, and 4 tegs per acre; of these 4 are sold yearly, which produces at least 300 lbs. of mutton. The potato crop being equal to from 60 to 80 sacks per acre of 280 lbs. each, is equal to 16,800 lbs. of good wholesome food, and, besides what is reserved for seed, there are at least 10 sacks per acre more of offal potatoes, by feeding pigs with which, if we can produce 10 lbs. of bacon per sack, we shall thus have 100 lbs. of animal food, in addition, from this crop. The average of the wheat crop may be taken at 28 bushels, each of which will produce 70 lbs. of

bread; this crop, per acre, will be equal to 1890 lbs. of bread; there are, therefore, produced from each of these acres 400 lbs. of mutton and bacon, 1890 lbs. of bread, and 16,800 lbs. of potatoes.

The advantage derived by the community at large from this mode of culture is evident from the increase in the productive food for man, thereby not only supplying the deficiency, but diminishing the price, of the first necessaries of human life.

JOHN MORTON.

Chester Hill, near Stroud, Gloucestershire, December, 1839.

NOTE BY THE REV. W. L. RHAM.

The rotation adopted by Mr. Dimmery may not be improper in a rich deep light loam, and in a populous neighbourhood, where additional hands can be obtained at any time at a reasonable rate. The two fallow crops succeeding each other are not altogether without precedent, as may be seen where potatoes are grown to a considerable extent on the Essex side of London. I have at this moment carrots, parsnips, mangold-wurzel, and potatoes growing on land which had winter tares, followed by turnips last year: and I would strongly recommend the practice where land requires to be cleaned and pulverised.

Wheat after potatoes has been often strongly recommended by various writers on agriculture; but practical farmers do not agree in admitting the advantage of it. Wheat often fails, or is mildewed, after potatoes in light soils, owing to the looseness of the land. A heavy roller may correct this defect; but after the potatoes are taken up the weather is often unfavourable to the use of a heavy roller. If the land is ploughed immediately after the potatoes are removed, and barley be sown in spring on the stale furrow, merely harrowed in, the grass seeds sown soon after the barley cannot fail to come up well. Barley seldom fails in a loose deep soil; and the clover or grass is required for the stock. Where would Mr. Dimmery get fodder for his cattle if he had not also a grass farm? 200 acres of meadow and pasture are a wonderful help to a potato grower. The farm in fact consists of 400 acres, half grass, half arable.

Potatoes are the most profitable crop which can be grown, where there is a regular demand for them; but the expense is great: they consume much manure, require much labour, and are heavy to carry to a distant market. Potatoes are raised in large quantities in some poor light soils in Surrey; and although within a few miles of the Thames, where they may have water-carriage to London, they are often sold at a rate which leaves but little profit to the farmer. If they are repeated often on the same land they degenerate and become diseased. All this is well known, and should be stated, in order that farmers may not be misled by statements which, however correct they are, should not be held out as examples for general imitation without some modifications.

That potatoes may be very advantageously introduced into general rotations admits of no doubt. They are always useful to feed cattle and pigs, if not sold for human food. In Germany they are extensively cultivated for the purpose of distillation. Without going to the extent of the late Mr. Cobbett, who anathematised them in his forcible language as food unfit for

the labourers, it is found that, beyond a certain extent, they are not thought so hearty as the coarsest grain, where the latter can be obtained. The sour black rye-bread, often mixed with barley, which is eaten in France and Germany by the poorer labourers, is still preferred to potatoes.

It would probably be found that, if potatoes were very extensively cultivated, the price would be so much reduced that the only profit from them would arise from their use as food for cattle; and this is their natural price. In Switzerland this is already the case; potatoes are often worth less than one-third of the price of an equal weight of good hay. Perhaps in those counties where potatoes are raised to be shipped to London, the proportion may not be far from this. At all events such a price as 5*s*. or 6*s*. per sack can only be obtained where they are used as a substitute for green vegetables on the tables of men in the middle and upper ranks of life.

When potatoes form a great part of the produce of a farm the calculation of their value should be made on the principle of home consumption, and they should be brought to market in the shape of cattle and pigs, which they will greatly assist in rearing, if not in fattening.

W. L. Rham.

XLII.—*Further Experiment on the Shed-feeding of Sheep.*—By John Walbanke Childers, Esq., M.P.

To the Secretary of the Royal Agricultural Society of England.

Sir,

After the success of my shed-feeding of sheep in the winter of 1838-39, I was induced to try it again last winter, and I now send you some of the results.

Having this year rebuilt a large part of my farm-buildings, I appropriated one shed, 90 feet long and 16 wide, for sheep: this, with a fold proportionably large, will accommodate about 100 Leicester sheep. My shed was not finished till January 1, 1840, when I turned into it 80 Leicester hogs, then from 9 to 10 months old.

These sheep when in the field had consumed about 50 basketfuls, called skeps, of cut turnips per day, beside oil-cake. On being brought into the shed, to my surprise, they were immediately only able to consume 30 baskets, and before a month had elapsed the quantity had decreased to 25 baskets; thus economising one half the turnips: they also ate less oil-cake. I found, nevertheless, that their increase was as rapid this year as it was the year before. I did not take the trouble to repeat the same experiments I then made, but I selected four sheep, which I marked and weighed once a month, and the result is as follows:—

		St.	lbs.
January 1st, 1840,	No. 1 . . .	11	4
	No. 2 . . .	10	8
	No. 3 . . .	10	8
	No. 4 . . .	10	5
Total weight		42	11

		St.	lbs.	Increase during each month. St.	lbs.
February 1st . . .	No. 1 . . .	12	2	0	12
	No. 2 . . .	11	13	1	5
	No. 3 . . .	11	12	1	4
	No. 4 . . .	11	4	0	13
March 1st. . . .	No. 1 . . .	13	3	1	1
	No. 2 . . .	13	7	1	8
	No. 3 . . .	13	3	1	5
	No. 4 . . .	12	2	0	12
April 1st	No. 1 . . .	13	12	0	9
	No. 2 . . .	14	6	0	13
	No. 3 . . .	14	3	1	0
	No. 4 . . .	13	0	0	12
May 1st	No. 1 . . .	14	2	0	4
	No. 2 . . .	15	0	0	8
	No. 3 . . .	15	2	0	13
	No. 4 . . .	13	12	0	12
		58	2		
Deduct weight, January 1st. . .		42	11		
Increase in four months		15	5		

On this increase I have one or two observations to make: it will be perceived that Nos. 2 and 3 have increased the most; they have never been amiss. No. 1 refused food for two days in February, and had a dose of salts. No. 4 has been twice amiss. This shows that if a sheep does not feed, even for two days, it considerably affects his weight.

Of the 80 sheep put up I sold about 50 at Rotherham, in March, clipped, at from 42*s*. to 48*s*. per head: and, I believe, no better hogs have been seen at that market this year. The rest I am keeping for a prize-show, which takes place at Blythe, in Nottinghamshire, on the 28th of May, where a prize is given for the 20 best hogs.

It will also be observed that the increase during the months of March and April was not so large as during January and February.

I think the greatest profit would be made by shedding them for about 10 weeks. By giving them cake and a little crushed barley, I think you may gain from 33 lbs. to 40 lbs. per head, in that time. (No. 2 gained 55 lbs. in 12 weeks.) Their increase in value cannot, during that period, be less than from 15*s*. to 20*s*. per head: and in this way you may feed off two or three lots during the winter. In 10 weeks they consume ½ a ton of turnips each; thus, with artificial food, an acre of 30 tons will feed no less than 60 sheep. The artificial food will cost from 6*d*. to 1*s*. per week.

The 28 hogs which I am now feeding for the show cost, per week, as follows:—

	£.	*s.*	*d.*
2 bushels of split beans, at 6*s*. per bushel . .	0	12	0
1½ bushels of white peas, at 5*s*. 4*d*. per bushel .	0	8	0
3½ stones of linseed cake, at 1*s*. 3*d*. per stone .	0	4	4½
5 stones of best clover-hay, at 4*l*. per ton . . .	0	2	6
1 stone of salt	0	0	6
	£1	7	4½

On these animals I spare no expence; and it may be observed that the linseed-cake bears a very small part of the whole cost, although they have as much of it as they will eat. If, in addition to cake, they have a very small quantity of peas and beans in spring, and of crushed barley in winter, I am convinced their progress would in general be sufficient, and satisfactory. Barley is not such good food in spring as in autumn, when the turnips are succulent. I have found it very advantageous to peel the turnips, which were Swedes, and pour water over them, when used late in spring—say April and May.

I have two observations to make:—1st, I think a great deal of the success depends on a boarded floor: my sheep never had the foot-rot; whereas, some of my neighbours, who tried the experiment without such a floor, were forced to turn their sheep into the fields again, as, whenever their feet get wet from the straw being saturated, the foot-rot comes on. The expence of the boarding (rough slabs) was about 25*l*.; it can be removed at any time, and the shed will then serve for cattle or horses. 2ndly, I find the shed as advantageous now in the hot weather (May 1st) as it was in the severest part of the winter. My sheep are reposing quietly under their shed, whilst those in the field are panting for breath.

It has been observed that this system of shed-feeding is robbing the land of the manure and treading of the sheep; and conse-

quently injuring the barley and seeds which follow. Now my custom is to draw only one-third or half my turnips, and, by giving oil-cake to the sheep which consume the other half on the land, to get as good barley and seeds as if I had eaten all the turnips on the land.

At the same time, when (if I can believe the results of my own experiments) I find that the turnips, if consumed under sheds, go so much further, and at the same time the sheep thrive much faster than they do in the field, I think it is worth considering whether the whole crop of turnips might not be drawn, and the manure returned to the land, or its loss supplied by rape-dust or artificial manures, drilled in with the barley. The treading of the sheep, I should think, might be replaced by rolling, especially with Crosskill's (of Beverley) roller, a most useful machine.

It is rather remarkable that this description of shed-feeding should have come from a sand-farmer. My land is light, and peculiarly favourable to sheep when on turnips; and if it is worth my while to feed sheep in sheds, the advantages to heavy-land farmers must be incalculable.*

JOHN WALBANKE CHILDERS.

Cantley, near Doncaster,
May 4th, 1840.

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* This last remark is well worthy of consideration; for if the system succeeds well in light land, where, from the friable nature of the soil, the treading of sheep may be more advantageous than otherwise to the after-culture, how much better must it succeed in lands liable to poach from the same cause !—WM. MILES.

XLIII.—*Agricultural Statistics of France.*—By Sir Charles Lemon, Bart., M.P., F.R.S.

Of the agricultural survey of France, 21 departments have been completed, and the proof sheets of the report are in this country. I have been favoured with the use of them, and have gathered from them the materials which are put together in the following paper.

The original returns are voluminous, and the results are not added up; so that it has been necessary, not only to reduce the sums into English weights and measures, and correct the proportions by the same scale, but to add together a vast number of figures extracted from each of these returns, and to arrange them under their several heads. I cannot hope to have escaped errors; but I trust that they will not be found important by any one who will take the trouble to revise my calculations.

These returns comprise 21 of the 84 departments of France; and extend over the whole of the north-eastern portion of the kingdom. They comprehend the whole, or the greater part, of the old provinces of Flanders, Artois, Picardie, Isle de France, Champagne, Lorraine, and Alsace. The departments are, Départment du Nord, Pas de Calais, Ardennes, Meuse, Moselle, Bas Rhin, Haut Rhin, Doubs, Jura, Aisne, Marne, Meurthe, Seine et Marne, Aube, Haute Marne, Vosges, Yonne, Côte-d'Or, Haute Saône, Cher, Nievre.

Their surface is about 6500 French leagues, or 12,843,000 hectares; equal to 31,722,000 acres, and hardly differing from the area of all England.

Of this extent, 12,386,363 hectares, or 30,594,316 English acres, form the subject of the returns. The remainder, being the difference between the whole area and the sum of the items returned, has been omitted; and so far the returns are imperfect. The omission is equal to $\frac{1}{27}$ of the whole, and should be taken into the account in summing up the gross produce of the 21 departments. I do not, however, attempt any correction, because I have no means of discovering how the defect should be distributed amongst the various articles of growth.

The following table shows the total amount, in English acres, of the land sown with each kind of grain, the quantity of produce obtained, and the seed sown. What is there called "méteil," is a mixture of wheat and rye somewhat extensively cultivated together. "Epeautre" is the name of another grain, which the dictionaries translate "spelt," and of which I can learn no more than that it is a peculiar kind of wheat (triticum), used sometimes in making macaroni, &c. Its gross produce is small, and I have not thought it necessary to encumber this short statement with any notice of it.

I cannot discover, with any certainty, from the form of the returns, whether the quantity of seed given is that from which

the crop returned was obtained, or whether it is that sown in the same year, and from which the crop of the year following would arise. I apprehend the latter; but it throws an uncertainty over the comparative results of seed and produce, as records of fact; though it does not influence the ratio of seed to the acre, which I presume is gathered from the custom of the country.

TABLE I., showing the Number of English Acres tilled with each sort of Grain, the Produce, and the Seed sown.

	Acres.	Produce in Bushels.	Amount of Seed sown.
Wheat . .	3,913,789	59,075,391	9,458,471
Barley . .	1,115,916	17,532,875	2,734,769
Oats . . .	3,129,359	54,179,336	8,298,751
Méteil . .	630,321	9,526,777	1,494,236
Rye . . .	1,124,909	13,332,935	2,675,389
Potatoes . .	645,233	93,649,112	10,748,567
	Total Grain . . .	19,205,914 quarters.	
	Whereof Seed . .	3,082,702 ,,	

The next table shows the produce per acre in imperial bushels, on the average of the whole 21 departments, and the highest and lowest average produce in any one of them.

Lest I should be supposed to have miscalculated this table, I think it right to state that the general average is obtained by adding together the averages of all the departments, and dividing by 21. The result, of course, will not agree with the result of a comparison of all the land cultivated for each sort of grain with the total produce of each, because the quantities in the several departments differ widely; but I thought that the method which I have followed would afford the best means of arriving at a notion of the *fertility* of the district, which is the object principally in view.

TABLE II., showing the average Produce per Acre of the 21 Departments, the highest and lowest departmental average, and the average quantity of Seed sown per Acre.

	Average Produce per Acre, in Bushels.	Highest Departmental Average.	Lowest Departmental Average.	Seed.
Wheat . .	15	23	10.5	2.6
Barley . .	17	35	8	2.6
Oats . . .	18½	44.5	11	2.8
Méteil . .	13½	22½	8	2.5
Rye . . .	13	20½	8	2.6
Potatoes . .	127	257	67	

It appears from these tables, that the whole produce of grain in these departments is equal to about 19 millions of quarters; and the seed sown to about 3 millions. Thus the increase may have been $6\frac{1}{3}$ for one.

M'Culloch calculates the whole amount of grain grown in England annually to be 52 millions of quarters, the average produce being as follows:—

Wheat	. . . . . .	26 Bushels per acre.
Barley	. . . . . .	32 ,, ,,
Oats	. . . . . .	36 ,, ,,

This is much above the generally received estimate, and shows an almost incredible increase of produce since the evidence of Mr. Wakefield before the committee of 1821. He computed the average produce of all England at 17 bushels per acre of wheat; but that Devonshire produced 20 bushels, and the lands near the coast of Kent, Norfolk, Suffolk, and Essex, 40 bushels per acre.

I have extracted also, from a table given by M'Culloch, materials for the following table; intended to show how much less is the difference in the average fertility of the counties of England than in that of the departments of France. As far as it goes it is evidence of the effect of art in surmounting the differences of nature, which must have been as wide here as in France; and, under the great improvements which have lately taken place in the agriculture of England, I have no doubt that the approximation is really much nearer, and the comparison more flattering to our agriculturists.

Table III., showing the average Produce of all England, the highest and lowest county average, and the county where it occurred.

	Average per Acre.	Highest.	Lowest.
Wheat	21	26 Nottinghamshire	16 Dorset.
Barley	$32\frac{1}{4}$	40 Huntingdonshire	24 Devonshire.
Oats	$35\frac{1}{2}$	48 Lincolnshire	20 Gloucestershire.
Potatoes	241	360 Cheshire	100 Durham.

In the French tables the first thing which strikes one is the lowness of the aggregate average of the 21 departments, and still more the great range of differences between the highest and lowest departmental averages. The Départment du Nord is that which yields the best return in almost all kinds of grain; and probably it owes this distinction to its proximity to the high cultivation of Belgium and Holland. It will be observed that the inferior grains, méteil and rye, make the least return in produce as well as value, which I suppose arises from their being sown only on the poorest ground.

The quantity of potatoes grown in these departments is much greater than I expected to find it. The consumption per head is about a bushel and three quarters for each person. The fallow lands were about 4 millions of acres, being in proportion to the land under tillage for grain somewhat more than as 4 is to 10.

Of artificial pastures there were $1\frac{1}{2}$ millions of acres.* The artificial grasses have been cultivated in these provinces for a great length of time; but the Duc de Cazes told me, in 1822, that when he first turned his attention to farming, no artificial grass whatever was cultivated anywhere south of the Loire, and that it was hardly known by name in those provinces. The population of the 21 departments amounts to 8,545,412 persons; and the grain of all sorts annually consumed by them is equal to 7.7 bushels per head.

Colquhoun calculated that each person in England consumed, on the average, annually, one quarter of wheat; or where other grain was eaten, in the proportion of $1\frac{1}{4}$ of barley, $1\frac{1}{2}$ oats, or $1\frac{1}{4}$ of rye to a quarter of wheat.

The consumption of wheat in these departments, compared with other grain, was as 5.35 to 2.35; and, reducing the 7.7 bushels before mentioned, to the standard of wheat, in the proportion in which the different grains are consumed, it will appear that each person in the north of France consumes very little more than what is equal to 7 bushels of wheat per year.

This is much below the consumption of grain in this country, and at variance with the supposed habits of the people. And as the quantity of butchers' meat consumed by them is also less than in England, it is difficult to understand how they are fed. I believe that garden produce forms a material part of their diet.

What the French call the animalization of the departments is shown as follows :—

Cattle	2,628,924
Sheep	6,764,107
Pigs and Goats	1,399,599
Horses	974,918
Mules and Asses	99,660

Of these, there were consumed for butchers' meat in the course of the year—

Cattle	1,055,026
Sheep	741,546
Pigs and Goats	1,378,736

The whole weight of the above was about 184 millions of kilogrammes — equal to about 406 millions of pounds, or

* About $\frac{1}{20}$ of the whole surface.

3,625,000 cwt. The consumption, with reference to the whole population, was about 48 lbs. of meat for each person.

In a note at the end of this paper I have given the best estimate which I could form of the consumption of butchers' meat in this country. It is far too vague to be brought into comparison with the French returns; but its evidence, as far as it goes, seems to show that the consumption per head is, annually, about 92 lb., exclusive of pig meat.*

In closing this paper, I must confess that I am rather ashamed to see how few results I have obtained from these documents. But it is the nature of statistical investigations to occupy time and labour in that which is afterwards expressed in a few figures; and though my sheaves may be few, the ground is open to others, and will not be the worse for the light tillage which it has received under my hand.

C. LEMON.

NOTE.—The average weight of animals sold in London is per carcase—

Bullocks	800 lbs.
Calves	140
Sheep	80
Lambs	50

Supposing that these are severally about $\frac{1}{7}$ more than the average of the kingdom, the weight of the whole will be as follows:—

Cattle slaughtered in England and Wales (according to M'Culloch)		1,305,000
Deduct Calves ($\frac{1}{10}$)		130,500
		1,174,500
Bullocks, &c. .	1,174,500 × 6 cwt. . .	7,047,000
Calves	130,500 × 1 ,, . .	130,000
Sheep	5,402,161 × $\frac{5}{8}$,, . .	3,376,000
Lambs	1,400,000 × $\frac{1}{2}$,, . .	700,000
		11,253,000 cwt.

* The consumption of pork by the lower classes of this country is however very considerable. Some of the statistical accounts of France which I have lately read (but I do not recollect where) state the relative quantities of butchers' meat consumed by the French and English as being nearly three times greater by the latter: but the former consume a vast deal more poultry, eggs, and garden-stuff.—F. BURKE.

Cattle from Ireland in 1838.

Cattle	. . . . .	98,150 × 6 cwt. . .	588,900
Sheep	. . . . .	125,452 × $\frac{5}{8}$,, . .	78,407
			11,920,000

The population of England and Wales was, probably, at the end of 1838, about 14,500,000 persons. Thus the consumption of butchers' meat was, on the average, about 92 lbs. for each person, exclusive of pig meat.

XLIV.—*Experiment with Poïttevin's Manure.* By William Miles, Esq., M.P.

To the Secretary of the Royal Agricultural Society of England.

Sir,

In reply to your inquiries as to the result of an experiment tried by me during the last season with Poittevin's desiccated compost, I beg to inform you that having had a hogshead from London about the first week in June, I drilled it in before the red-ring turnip, at the rate of 13 bushels per acre. The price of the manure was as follows, per hogshead, containing 36 bushels:—

Charge of compost	£3	0	9
Cost of hogshead, &c.	0	12	8
Cost, per canal, from London . . .	2	5	6
Carriage from Bristol	0	11	0
	£6	9	11

Alongside the piece thus treated similar seed was placed, having been deposited in the usual manner on the ridge, with good farm-yard manure beneath, at the rate of about 25 tons per acre. The land I had only taken in hand two years before, and it was in a most filthy condition; everything had, however, been done during the spring to eradicate weeds and to procure a good tilth; this was tolerably effected, but still the seeds of charlock and other annuals remained, and I think I never saw so luxuriant a crop of these as appeared, in most cases previous to, but in all cases where the farm-yard manure alone was used simultaneously with the turnip. Not so, however, in those ridges which had been manured with the compost, the vegetative powers of which appeared so strong, as I conceive, both from its inherent qualities and from the turnip-seed having been immediately deposited upon the compost in a finely pulverised form by the action of the same

drill, that the rows of turnips made their appearance from three to four days previous to the seed which had been sown on the common manure, and had got well to the rough leaf before the charlock in any way interfered with the plants. The crops went on together very well until the 8th of July, when I perceive by my farming-book, that the black caterpillar first appeared; its ravages were extended to both crops indiscriminately: as usual, however, with me, it attacked the field in patches, making sad havoc with the Swedes, and entirely skipping over four rows of mangold-wurzel, which had been placed between the Swedes and red-rings by way of experiment; to ascertain whether that plant could escape when surrounded by a crop infected by the caterpillar. After this I found very little perceptible difference existed between the turnips which were the subject of the experiment: in the first week in November I pulled and weighed a row of each, and the result was, that from rows of 510 feet in length I obtained from that dressed with Poittevin's manure 11 cwt. 37 lbs., whilst that dressed with the farm-yard manure weighed 11 cwt. 96 lbs.—giving a produce of 21 tons per acre from the ground dressed with the compost, and 22 tons 10 cwt. from that treated in the common mode. I should have stated that the soil upon which the experiment was tried is a sandy loam upon mountain limestone. It is my intention, as the parts of the field which were manured in the different ways are accurately marked, to keep some account of the succeeding crops, as I need scarcely mention to you that, should a dressing of Poittevin's manure carry the different crops through the course equally well with the farm-yard manure, laid on at the rate of 25 tons per acre, the introduction of a system which, by concentrating the strongest of all manures, renders it thus portable, will be of the greatest benefit to the agricultural world. Should you require any further information upon the point, I shall have much pleasure in giving it.

I remain, Sir, your obedient servant,

WILLIAM MILES.

King's Weston, near Bristol,
April 2nd, 1840.

XLV.—*Experiments with Manures.*—By Mr. William Sim. Communicated by Sir Francis A. Mackenzie, Bart.

Experiments made at Drummond, in Ross-shire, N.B., in 1839, with different kinds of manure, for a crop of barley:

No.	Kind of Manure used.	Quantity per acre Scotch, equal to $1\frac{1}{4}$ statute.	Price per acre.	Quantity of seed per acre.	Return of grain per acre.	Weight per bushel.	Quantity of straw, pr. stone of 16 lbs.
			£. s. d.	bush.	qrs. bhs. ps.	lbs.	sts. lbs.
1	Farm-yard dung	18 double loads	3 3 0	$4\frac{1}{2}$	8 1 1	53	226 8
2	Rape-dust . .	10 cwt.	3 8 0	$4\frac{1}{2}$	7 3 0	$51\frac{1}{2}$	252 8
3	Bone-dust . .	10 bush. dust	1 10 0	$4\frac{1}{2}$	7 5 2	53	211 14
4	Nitrate of soda	140 lbs.	1 5 0	$4\frac{1}{2}$	7 5 0	$52\frac{1}{2}$	213 0
5	Saltpetre . .	140 „	1 17 6	$4\frac{1}{2}$	6 2 0	$52\frac{1}{2}$	186 0

Remarks.—The different kinds of manure were applied on the 3rd of May, and the barley, which was of the common sort, was sown on the following day.

No. 1.—The farm-yard dung was put up early in winter, and turned, with a mixture of some of the soil of the field, in the beginning of March.

No. 2.—The plants on this portion having turned yellow, were longer in stocking or tillering than the rest; but afterwards having become very luxuriant, the grain was longer in ripening, and even though left a fortnight longer uncut, there was greater inequality in the grain. If the season had been earlier, or the field sown a month sooner, I have no doubt from the greater bulk, there would have been a greater return than on any of the other lots.

No. 3.—This lot had four bushels of kiln ashes mixed up with the bone-dust to make them spread more equally.

No. 4.—The same quantity of kiln ashes were used with the nitrate of soda.

No. 5.—Only three bushels of kiln ashes were applied with the saltpetre, but I do not think the ashes made any visible or material difference, as a ring sown without ashes was as good as the rest.

The field on which the experiments were made is a good deep loam, on gravelly subsoil, very uniform in quality. The previous crop was one of pease, which were very luxuriant, and left the ground quite clean. The land was ploughed across in November, and got another ploughing, after being well harrowed immediately previous to sowing.

The result of the experiments appears to me to be in favour of nitrate of soda, though there is a remarkable similarity in the Returns between No. 4 and No. 3.*

I tried saltpetre and nitrate of soda with the same quantities per acre for turnips, but the turnips upon them were nearly a failure, while on either side they were good after farm manure and bone-dust.

F. A. Mackenzie.

Cowan House, Dingwall, N. B.
February 8, 1840.

XLVI.—*On the Culture of the Parsnip.*—By Colonel Le Couteur.

Having been written to by several agriculturists within the last twelvemonth, on the culture of this root, I beg leave to submit the following notice of its present usual cultivation in the island of Jersey, as well as of a recently-adopted practice which has been found to answer.

BROAD-CAST HUSBANDRY.

Nature of Soil.—The parsnip will thrive in any deep land, whether stiff or light; it succeeds here admirably on soil resting on granite or sienite, on argillaceous schistus, on red clay, or on a gravelly bottom; on almost pure sand if mixed with a light coating of earth, and on soils derived from pudding-stone, or white and red feldspar. This includes most of the soils of the British islands, exclusive of the chalky or limestone ranges which are unknown to us.

It is proper to add, that some cultivate this plant on poor black heath soil, not above seven or eight inches deep, and by means of heavy dressings of manure raise a good crop; but the parsnip in such situations forms a large shoulder, and forks away into fingers, when near the hard subsoil; whereas in very deep land it will run down a foot or two, of a good size, and sometimes appear with a long whip-thong, as it were, to its thick handle.

An old grass ley is broken up by some persons in September, by others just before the parsnip-seed is sown. The former I consider to be the best mode. When the turf is well rotted, 20 tons of stable manure per acre are spread over the land. A trench

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* In point of immediate profit: but the result of the experiment can only be ascertained by their future effects upon a course of crops.—F. Burke.

is then opened through the centre of the field, between 2 and 3 feet wide, and, where the soil will admit of it, from 1 foot to 18 inches deep.

A small 2-horse plough then turns the manure and about 3 inches of soil into the trench, and is immediately followed by a large trench-plough with 3 or 4, and in many cases here with 8 or 10 horses, which turns a foot or more of clean soil upon the manure and scurf, when the land has been recently skim-ploughed.

Quantity of Seed.—The soil is then harrowed, and the parsnip-seed, which should be NEW, is sown at the rate of 3 or 4 pounds to the acre, and lightly harrowed.*

Weeding or Hoeing.—When the plants are an inch high they are to be weeded,—this was formerly contracted for at the high price of 2*l.* 5*s.* per acre,—to be repeated thrice by hand in the season, and to leave them without a weed; but this extravagant mode has given place to hoeing, which can be done at less than half the cost, and is probably more beneficial, as it stirs the land deeper.

In Guernsey a still more expensive mode is adopted, that of weeding with a hand-hoe, having a straight blade of iron, 8 inches long, 4 or 5 inches wide at its edge, narrowing upwards to a short handle a foot long, with an elbow to it nearly at right angles; the blade is pressed into the earth, and the crooked handle affords a leverage, which enables the person to stir it effectually, and destroy every weed. This is mentioned incidentally, as it is too slow a mode for the rapid principle which has now obtained in all things; however, it may be a question whether a greater crop was ever raised by other means than one produced in the ordinary way, which I shall presently mention. The plants from the first are to be thinned out to 6 inches apart, and according to the soil, should be again thinned out to 9 inches or more at the second hoeing.

In September, when the fine aftermath begins to appear, some of this crop may be taken up for milch cows, as from a dozen to 25 pounds of them, given at milking time, will have a surprising effect on the cream, and produce fine yellow butter, which will keep admirably if properly salted and prepared, preserving an excellent and superior flavour.

Parsnips are usually taken up with a stout three-pronged fork, but a more speedy method will be described in the drill system.

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* I have some fine-looking parsnip-seed which was saved here in 1838, and has ever since been kept in a perfectly dry place, not a grain of which will vegetate, though some has been soaked, and sown in the green-house, in order to test its vegetative power.

DRILL HUSBANDRY.

The land may be prepared as above described. In one case I found the plants to answer well by spreading a portion of the manure on the surface of the ploughed land, and then earthing it up into small ridges, a foot apart, with a double-mould board-plough. The seed was then sown on the top of the ridge and rolled in, which succeeded extremely well. The hoeing was performed with a hoe-plough in the drills, and the plants were cross-hoed with a hand-hoe. This mode does not appear so neat as the following :—When the land is well harrowed and levelled, sow the seed broadcast, harrow and roll it; then, when the plants appear, hoe it into drills, either with a hoe-plough or hand-hoe. A drill-machine would be the best method, if one could be found, to sow parsnip-seed regularly; mine sows it much too profusely. The parsnips require hoeing and thinning as in broad-cast husbandry. In a dry season it is well to observe, that moistening the seed with wet sand or earth, and stirring it daily, to be sown in the first moist weather, or after a shower, will forward its growth a fortnight.*

Housing.—The crop should be taken up in October or November, though parsnips are not much injured by frost, and probably, if earthed-up by a hoe-plough might remain in the ground the whole winter.

The late great improvement in taking them up has been to substitute a plough for the fork.

A plough with a blunt or worn-out share, and without a coulter, being drawn by a pair of horses, along or across the ridge, as is most convenient, the pressure of the plough and earth forces the plants out of the ground; and although a small portion of the long tapering root is sometimes broken off, yet the time saved by thus raising them, and afterwards throwing them out of the loosened soil, as is done with potatoes, is an enormous gain of time over the ancient practice of forking out each parsnip from the solid ground.

Usual Weight per Statute Acre.—The average crop per statute acre may be from 9 to 11 tons, but in the eastern district of Jersey last year, the visiting committee of the Agricultural Society, proceeding to examine crops of parsnips in competition for a premium, were unable to distinguish, by mere inspection, which was the finest of three—the plants in each appearing, from their luxuriance, to cover the soil, and to be nearly alike. On proceeding to proof by digging up a square perch of 22 feet of each, one was

* In all cases, seeds that have been moistened should be sown on moist ground; for if small moistened seeds, especially, be sown on a very dry soil, under a hot sun, the chances are that they will be dried up and destroyed. This applies to spring, or early culture in summer, when a fortnight gained may be important.

found to produce 325 lbs.; the second 425 lbs.; and the prize-crop, 634 lbs., Jersey weight, or the enormous quantity of 682 lbs. imperial, being 61,380 lbs., or 27 tons 8 cwt. per acre; a quantity nearly sufficient for 10 cows during the 6 winter months, according to the calculation of the Flemings; and more than enough for 12 Jersey cows, in my estimation, together with straw, hay, and a few mangold-wurzel, or turnips; it being well known to all but novices that cattle will not thrive on one kind of food.

In October the leaves, as they *begin* to decay, should be cut off, and given, when dry, to the cows: it is important to see that they be dry, as when moist from rain or dew they are apt to inflame the udder.

The leaves come in as a convenient auxiliary to grass at this period, and if given *moderately*, a good armful per day to each cow will impart nearly as much richness to the milk as the parsnip itself.

This most excellent root will fatten oxen or pigs (or poultry if boiled) in an extraordinary manner, and is certainly one of the best preparatory crops for wheat.

It will keep in a dry store until April, and previously to storing should be stripped of its leaves, if any remain attached to it.

It is to be observed, that after the second hoeing the ample-spreading leaf of the parsnip covers the soil, and generally smothers all after-weeds, deriving also, perhaps, much nourishment from the atmosphere, whereas, the less spreading thin leaf of the carrot may not do so in an equal measure, and certainly in my experience allows more space and air for the growth of autumnal weeds.

A careful experiment is now in progress in order to ascertain the merits of the new white carrot, as compared with the parsnip, both being cultivated in the same manner.

In 1834, 2½ drills of the Alteringham or cattle carrot produced 261 lbs., and an equal portion of land in parsnips afforded 840 lbs.

There were many autumnal weeds among the carrots, and none in the parsnips, though treated alike.

Sir Humphry Davy states, that 1000 parts of carrots furnished 95 parts of sugar, 3 parts of mucilage, and ½ part of extract: 1000 parts of parsnips afforded 90 parts of saccharine matter, and 9 parts of mucilage. Hence may not the excess of mucilage in the parsnip be one cause of its superior fattening, as well as butyraceous quality?

J. Le Couteur.

Belle-Vue, Jersey, April, 1840.

XLVII.—*Experiments with Nitrate of Soda.*—By David Barclay, Esq.

To the Secretary of the Royal Agricultural Society of England.

Sir,

Nitrate of soda having become an object of considerable attention for agricultural purposes, I have made several practical experiments with it on my own farm, and have also sought information from some of my neighbours who have used it as a manure, and on whose accuracy and care in their experiments great reliance can be placed. As it will probably be interesting to many members of our Society to be informed of the results of these inquiries and experiments, I will proceed to describe the details of them :—

I addressed the following questions to my neighbours—Walter Calvert, Esq., of Ockley Court; Messrs. Drewitt and Son, of Piccard's Farm, near Guildford, of high reputation in this country as practical farmers; and, to Mr. George Dewdney, of Dorking, eminent both as a farmer and a miller. I addressed myself to these gentlemen, knowing that they had used nitrate of soda extensively on their farms.

Question 1. To what crops have you applied nitrate of soda?
2. In what manner?
3. In what quantity per acre?
4. The time of year when applied?
5. With what effect on the crop?
6. With what effect on the after or succeeding crop?

With the consent of these gentlemen I will transcribe the letters with which they favored me in reply to these inquiries.

Ockley Court, January 9th, 1840.

Dear Sir,

I formerly used saltpetre as a top-dressing in the spring, but it became too dear; and seeing nitrate of soda always quoted in the newspaper with saltpetre, I thought it might answer my purpose as well, and have tried it now for six or seven years. The result of last year's experiment you will see below. We don't attempt to grow barley on this poor soil, but I know no reason why nitrate of soda should not answer for that as well as wheat and oats; and I cannot help thinking 1 cwt. per acre is sufficient, as most of the corn dressed with it was laid. You must not expect much benefit from it after one crop; but, if its price keeps down, and it always makes as good a return as it has hitherto done with me, I shall have the satisfaction of thinking I have done some service to the agricultural world.

I remain, yours sincerely,

Walter Calvert.

Experiments tried with Nitrate of Soda on Wheat and Oats on Ockley Court Farm, in 1839.

With nitrate $1\frac{1}{2}$ cwt. per acre—13 rods of land produced $30\frac{1}{2}$ gallons, or 230 lbs., of wheat, and 8 trusses and 32 lbs. of straw; equal to 5 qr. 5 bu. 6 gal. of wheat and 106 trusses of straw per acre.

Without nitrate—13 rods of land produced 22 gallons, or 165 lbs., of wheat, and 6 trusses and 1 lb. of straw; equal to 4 qr. 1 bu. of wheat and 72 trusses of straw per acre.

The above experiments prove in favour of nitrate of soda 1 qr. 4 bu. 6 gal. of wheat and 34 trusses of straw.

Oats, manured with $1\frac{1}{2}$ cwt. of nitrate, produced 2 qr. 4 bu., and 29 trusses of straw per acre, more than oats without nitrate.

Nitrate of soda seems to act most on wheat, oats, rye-grass (particularly the Italian rye-grass), tares, and aftermath on meadows. The best time for sowing is April and May for wheat; but much depends on the season. It is very useful to throw on pastures, especially where cattle have neglected to feed. I have used it ever since 1833, more or less every year, but I saw the most decided advantage from it these two last seasons.

Castle Mill, January 18*th*, 1840.

Sir,

I beg to say that I have used nitrate of soda as top-dressing on wheat, oats, and pasture, with the best effect. On the wheat crop not only is there a greater abundance of straw, but a great increase of corn. On my own land I grew last year more wheat by 10 bushels per acre than ever I grew before, and the straw much finer and stronger where I used the nitrate. I am acquainted with three very practical men, who tested it last year in the following manner:—by sowing a land throughout the field with the nitrate, and at harvest carefully reaping it by itself, and the adjoining land also, keeping it separate. On thrashing, in each of the three instances, the result has been nearly the same, although on very different land, the average being one-third more corn and one-fifth more straw.

On oats it is of the greatest service, producing much more corn, and the straw growing very strong and large. On pastures and clovers the effect is wonderful: in ten days the greatest difference can be perceived, exceeding the effect of a good dressing with mixed mould and dung: and I should observe that the pasture is much better in quality, producing the finest herbage.

2ndly. I sow it by the hand, or broad-cast.

3rdly. From $1\frac{1}{4}$ to $1\frac{1}{2}$ cwt. per acre: a man sowing it by the same stride and swing as when sowing wheat, will put on about 140 lbs. per acre; which, from my own experience, as well as from good information, I consider ample.

4thly. From the 10th of April to the middle of May; but this must of course depend much on the season. It works best when sown after or during a shower, as it then almost immediately dissolves. I think it of

the greatest service to wheat in May, at the time it looks sickly, as is almost always the case; for where I have known it tried on yellow pieces, it will quite alter the appearance of the wheat in a week, producing a luxuriant green; in fact, it gives a fresh impulse, which no other dressing except saltpetre can do. On this, as well as every sort of crop, it ought not to be used in the middle of the day, unless in damp weather, otherwise the sun will scald, and in some instances kill the blade. I knew one person, last year, destroy a crop of pease by sowing it in hot and dry weather; as the cup or hollow part of the leaf held the nitrate, which, as it gradually dissolved, scalded and killed the plant.

6thly. This question I cannot answer so fully as I could wish, nitrate of soda not having been tried long enough, very few having used it till last year; but I tried it the year before last on pasture, and had very much more grass last year where it had been used, which may be attributable in some degree to the great partiality the stock had in feeding where the nitrate was sown, and where consequently the ground was more dressed. In the garden it is of much service, particularly on onions, which in dry seasons are very subject to a small white maggot, like the gentle, which soon destroys the plant. One of my workmen last summer had a bed which was fast dying off; he merely washed three empty bags in as many pails of water, and about six o'clock the following morning watered the onions, when the sun was bright, which killed every weed, and I suppose every grub, as a finer bed of that very useful bulb (onions) need not be seen than this was in a very short time. I saved some cauliflowers in my own garden nearly in the same way, by sprinkling half a handful round the stem, and watering them after. I have omitted mentioning that on the Swede crop, on which, in two instances I have known it used, it has had very excellent effects: the nitrate was sown two or three days after the seed.

I remain, Sir,

Your obedient servant,

David Barclay, Esq. Geo. Dewdney.

Piccard's Farm, Guildford, 2nd March, 1840.

Sir,

In reply to your questions relating to *nitrate of soda* as a manure, we (myself and son) have lately adopted the use of it, instead of saltpetre, as a top-dressing for our corn crops, and as a sufficient manuring for our turnips, on all soils but chalk. We have generally applied it to wheat early in March, about $1\frac{1}{2}$ cwt. per acre, sown broad-cast, and have found it increase the produce materially. In one experiment of last year, where an equal portion was reaped, thrashed, and measured separately, the increase where the nitrate of soda was sown was 12 bushels of wheat and 31 trusses of straw per acre; but the quality of the corn somewhat inferior. We have also used it on barley with very similar effect; sown about the first week in May: and for turnips, we sow it on the fresh-ploughed land, drill the seed, and harrow it in together.

We have not used it long enough to ascertain if it will have the same

effect on the after-crops which saltpetre has. The saltpetre we sowed, on alternate lands, on the barley in the spring of 1837, produced a superior crop; and, in the summer of 1838, two very superior crops of clover; and, in 1839, the effect was very visible in the crop of wheat.

We are, Sir,

Your very obedient servants,

David Barclay, Esq. DREWITT AND SON.

My own experiments were made upon wheat, sainfoin, clover-seeds, tares, meadow and pasture, and Swede turnips. The nitrate of soda was sown upon all but the last, in the month of March, 1839, in the proportion of 112 lbs. to the acre, to which were added about 30 lbs. of wood-ashes, the object of which was to enable the sower to spread the nitrate with more regularity.

The sainfoin, tares, and pasture, were much improved by the application of the nitrate; the effect on the meadow-grass was also very perceptible for some time; but, having been exposed to severe frosts in May, the injury it received was so great, that there was little to mow at hay harvest.

The application on clover seeds was very successful: on one field consisting of 6½ acres, nitrate of soda was sown on 4 acres, and, on the remaining 2½ acres, ground bones and ashes. The 4 acres produced at least 50 per cent. more clover per acre than the part manured with bones. Immediately after the clover was cut, the field was ploughed up and sown with rape; the crop was very good on the 2½ acres, but thin on the 4 acres, which had been dressed with the nitrate, and it appeared as if the stimulating principle had exhausted itself in the first crop.

My experiments upon wheat and Swedish turnips were conducted with more exactness.

The wheat was sown after a clover ley, conformably to the usual practice in this county, on a loamy soil with a chalk subsoil, the land having received previously a dressing of farm-yard manure. The nitrate of soda was applied in the proportion of 112 lbs. to the acre, up the middle of the piece, which consisted altogether of about 25 acres; a portion of the land was accurately measured, and an exact account taken of the results in head and tail wheat and straw, which reduced to the proportion for one acre were as follows, viz.:—

Where no soda was sown, 3 quarters and 7 bushels the acre of wheat, and one load and 32 trusses of straw; the weight of the sack was 255 lbs., and the tailing wheat weighed 72 lbs.

Where the nitrate was sown, the produce of wheat was 4 quarters 1 bushel 4 gallons and 2 quarts, and of straw 2 loads and 8 trusses, being 2 bushels 4 gallons and 2 quarts more wheat,

and 12 trusses more straw per acre; the weight of the sack was 248 lbs., or 7 lbs. less, and the tailing wheat 104 lbs., or 32 lbs. more than where no nitrate of soda was used.

In order to ascertain what difference of value existed, I directed the two samples to be taken on the same day to a neighbouring market and sold at the best prices obtainable. The nitrate of soda wheat sold at 74*s.*, the other at 78*s.* the quarter. The account will then stand thus:—

Wheat, per acre, on which Nitrate of Soda was sown.

	£.	s.	d.
Nitrate wheat, 33 bush. 4 gal. 2 qrt., at 74*s.* per qr. . .	15	10	5½
Straw . . . . 2 loads 8 trusses . . . at 36*s.* per load.	4	0	0
	19	10	5½
Expence of nitrate of soda per acre. . .	1	0	0
	£18	10	5½
Wheat, without nitrate. . 31 bushels . . at 78*s.* per qr.	15	2	0
Straw . . . . 1 load 32 trusses . . . at 36*s.* per ld.	3	8	0
	£18	10	3

This result certainly both surprised and disappointed me, for the wheat appeared, while growing, much stronger, and, when ripe, a much heavier crop than that part of the field where no nitrate had been used. I suspected some mistakes in the calculations, but I am assured that no error has been committed; I must therefore conclude that however successful the application of soda has been to wheat on my neighbours' farms, some cause has operated to render the result less advantageous upon mine. It is observable that I used 56lbs. the acre less of the nitrate of soda; but, nevertheless, part of my wheat was laid, and had I increased the quantity of nitrate, my bailiff is of opinion the whole would have been down. He accounts for the comparatively unsuccessful result by reminding me that there were several blighted spots on the part dressed with the nitrate; the other part of the field was not free from blight, although certainly less affected by it.

The experiment on Swedish turnips was made in the following manner. Four lands were appropriated to the purpose:—

On the first, the seed was drilled with bones and ashes.

On the second, the nitrate was drilled in with the seed.

On the third, the seed and nitrate were both sown broad-cast.

On the fourth, the seed was drilled and the nitrate of soda sown

broad-cast. In the preceding January 20 rods of each land were carefully measured—the Swedes drawn and weighed—

The first, with bones and ashes, produced . .	30½ cwt.
The second, with nitrate drilled in	31 „
The third, seed and nitrate, both broad-cast . .	35 „
The fourth, seed drilled and nitrate broad-cast .	38 „

The quantity of nitrate used in each experiment was at the rate of 112lbs. the acre, and on the first land the dressing was at the rate of 15 bushels of ground bones and 15 bushels of wood ashes per acre, which, at 2*s.* 3*d.* the bushel for the former and 6*d.* the bushel for the ashes, would cost 41*s.* 3*d.* per acre, while the expence of the nitrate did not amount to 20*s.* the acre.

One experiment, however accurately conducted, it is obvious cannot be conclusive; but so far as the foregoing may be relied on, it shows that, at less than one-half the cost of bones and ashes, nitrate of soda, drilled in with the seed, produced an equal weight of Swedes, and when sown broad-cast, the produce exceeded that weight by 20 to 25 per cent.

The experiments which have been made with this new manure require to be repeated, and their accuracy established before any practical conclusions can with *certainty* be built upon them—variations in the soil and peculiarities of the season may also affect the results; but, so far as I have had the opportunity of judging, I am led to believe, that, judiciously applied, it will prove a most valuable fertiliser and considerably increase the crops of all sorts of grain, turnips, and all the grasses; that the most advantageous mode of application is by broad-cast, either during rain, very early in the morning or in the evening after sunset—that the quantity per acre should be from 1 to 1½ hundred weight, according to circumstances; that it is better to sow it rather late than early in the spring, in order that the plant, the growth of which has been much stimulated, may not be exposed to severe frost. Its fertilising principle, I think, is exhausted by the first crop, and it appears to me that pasture being better the second year is not inconsistent with this opinion, as the improvement is to be attributed to a secondary cause, viz., the greater quantity of dressing left on the land by the stock.

It is observable in Messrs. Drewitt's statement that the quality of their wheat, grown upon the land dressed with nitrate of soda "was somewhat inferior," and that mine sold at 4*s.* the quarter less than the wheat grown on the adjoining lands—the increase in quantity afforded however a large compensation to my respectable neighbours. These facts have led me to doubt whether this manure be universally advantageous for wheat, and to think that it may not be advisable to use it on land subject to blight; and

Messrs. Drewitt, it will be observed, do not recommend it on chalk soils.

To conclude, although I cannot boast of having had equal success with those gentlemen whose letters I have transcribed, I consider that I have been amply repaid for the cost of the nitrate of soda used upon my farm during the past year, and I am now making further experiments on a larger scale.

I have the honour to be, Sir,
Your obedient servant,
D. BARCLAY.

Eastwick Park, near Leatherhead, Surrey, April 24, 1840.

XLVIII.—*On the Draught of Single Cart-Horses.* By THOMAS JOHN LLOYD BAKER, Esq. Extracted from a Letter to THOMAS RAYMOND BARKER, Esq.; and communicated by him.

IT is about twenty-five years since I began farming. I started with two things in which I differed from my neighbours; and, I think, I succeeded in both. I am glad to see that they are now under the consideration of the English Agricultural Society. I mean the introduction into general use of lighter and more active farm-horses, and of single-horse carts instead of waggons or heavy carts. I shall show that these are connected.

The horses generally used in the county of Gloucester are either all bad varieties of the old Lincolnshire blacks, or those of any other sort that can do nothing else. The former are the most common: they are heavy, slow, loose-jointed animals, whose weight, without a load, is nearly as much as they are equal to. They generally plough about half an acre in a day; and with this most of our farmers are satisfied, because their neighbours do no more.

About the year 1827 I determined to try if I could not have a breed with more activity, with little or no diminution of strength. I considered the merits of our best sorts, and I fixed on the Cleveland, because I thought that, from its nearer resemblance to thorough-bred horses, if a mare of this breed was put to a thorough-bred horse by any man who happened not to want to breed a cart-horse, the colt would sell to a London dealer, at five years old, as a carriage-horse (or possibly even as a hunter), for more money than a cross of any other breed, that would answer well for

farm-work, could be expected to fetch. A Yorkshire friend purchased for me a Cleveland stallion, and I bought a few Gloucestershire cart-mares, as clean in the leg as I could get them. I sent my horse to a few towns in my neighbourhood on market-days, but the farmers did not like him; I lost money by doing so, so I put him to my own mares, and worked him on my farm, where he now is. I have no farm-horse, except two mares, which I believe to be thorough-bred Clevelands, that is not descended from him; and I confess I am rather proud of my teams.

When Old Cleveland was at his full size he measured 16 hands $1\frac{1}{2}$ in. high, $9\frac{3}{8}$ in. round the pastern, 10 in. round below the knee, 21 in. round the arm, $15\frac{5}{8}$ in. round the knee, and 6 ft. 10 in. round the girth. When measured he was in good condition, but not what you would call full of flesh. His legs as clear of hair as those of a race-horse. He is exceedingly good at his collar.* I wish these admeasurements were compared with those of any cart-stallions in other neighbourhoods, as well as the weight that he has drawn, as above, with that which others draw. I am sorry to say he is almost worn out. I have also a mare that we call a thorough-bred Cleveland, though we do not know her breed, that is so good at her collar that my people always choose her for any of our hardest work, such as timber-hauling and the like, where the greatest steadiness and temper are necessary. So much for my thorough-bred Clevelands.

My teams are chiefly composed of horses got by this stallion out of the clean-legged Gloucestershire mares which I mentioned above. Still desirous of introducing the breed if I could, I showed, at our cattle-show in November, 1838, my best mare and a foal of her's by my horse above mentioned, as extra stock. Some thought them good, but denied that they were *cart-horses*.† At our cattle-show in November last I exhibited in the yard one of

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* There can be little doubt that such an animal as that here described would form a good cart-horse; and it might be very desirable if farmers on light lands were to cross their mares with stallions of the Suffolk-punch, Clydesdale, or Cleveland breeds; but I cannot admit that the *real* Lincolns are so worthless as Mr. Baker supposes; for, in the heavy work of ploughing stiff clays, speed is of less importance than strength, and a draught animal throws forward as much of his own weight as enables him to overcome the weight, or equivalent resistance, that is behind him. Nor are they profitless to the breeder, for their work nearly pays their keep until five years old, at which period they are sold at large prices to the London dealers: and it must be admitted that a Lincoln black, of the pure breed, stands foremost in the rank of every cart race in the kingdom.—F. Burke.

† Mr. Codrington, who gives the premium, has set this at rest, by offering it for the entire colt of the best breed for agricultural purposes.

my teams (my best of course), two abreast, in a waggon with six-inch wheels, which had been loaded with dung for the purpose. It weighed six tons one hundred and a half. They had drawn it along the road at their usual rate of going, which had been ascertained to be three miles an hour. In the yard two horses were taken off, and the other two, in double shafts, drew it, backed it, and turned it, several times, and at last they drew it on a level Macadamised road for a short distance (20 or 30 yards) with one of the wheels dragged.

I do not mean to say that there are not many pairs that would have done all this; I am sure there are: but I contend that horses that can do it are fit for all farm purposes; and that being so, the greater activity which I have stated of going three miles an hour on the road, which few or none of the heavy horses, as I believe, can do without hurting themselves, and also the better pace at which they go in ploughing, give them a decided superiority over the others. Add to this the advantage which I shall come to of trotting in the carts. There is no more difficulty, expence, or trouble, in breeding, rearing, or feeding them, than there is with the others; of course, with both, a colt fed well and kept warm will do better than one that is half-starved; but if a man chooses to starve his colts, I really believe that these will rough it as well as the others.

Now for carts.—My land is a stiff clay; my carts are on six-inch wheels, and made to hold half the quantity that my neighbours carry in theirs. My land is hilly: my carts generally go with one horse, but up hill, when loaded, another is put on before, which comes down the hill with the next returning cart. Thus, on level ground, with two carts and two, or perhaps with three, horses, I take out the same quantity of dung that my neighbours carry in their large carts with never less than three horses, and often with four. All my carts have reins; a boy walks and drives them when loaded, but when returning empty he gets into the cart and trots back at the rate of about five miles an hour, which of course saves about half the time in returning. Here again I have a manifest advantage in using lighter and more active horses.*

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* Notwithstanding this superiority in favour of single-horse carts, their sole use for every purpose may however be doubted. In mere farm-work, for carrying out manure, they are evidently more convenient; but, on heavy road labour, presuming three to be equal to a four-horse waggon, they not only require more drivers, but the turnpike-tolls are also greater; and the cost of three such carts is more than that of one waggon. Even supposing these three carts to be driven by one man, still the horses drawing them must be each of equal strength; whereas, in waggon-work, the average

Some time ago I made the following trial. Two heaps of stone, of 32 tons each, were landed from a barge: they were to be taken to the same place, about a mile and a quarter off. A farmer began the first with two large carts and three horses; one cart was being loaded while the other was moving, and the horses were taken off and put on at every load. Finding that he could not do it in the day, he gave over at the end of about six hours, and set to again the next morning; this rest, of course, giving him an advantage, as you will see, but, anxious for their own credit, both he and his man made the very best use of their time. Their work was completed at eleven loads (which of course is nearly three tons to each load, or one ton to each horse), in nine hours and fifty minutes. I began the other heap with three small one-horse carts, and completed it in one day, at twenty-one loads (being nearly a ton and a half to each horse), in six hours and one minute; which was a saving of about three hours and a quarter on nine hours and fifty minutes, or rather more than one third. In this I had three decided advantages—first, the saving of time by trotting back; secondly, the rest that each of my horses got in his turn while his cart was being loaded; and, thirdly, the ease with which my carts were loaded in consequence of being lower.

One objection to these horses is, that they will not work well with those that are slower — they fret if you keep them to a slow walk; and if they were to become general, we should certainly want to improve our breed of carters as well. How this is to be done I do not know; but I have not the least doubt that a cross, either of the Cleveland or the Clydesdale—or even, if it were well chosen, of the thorough-bred horse—would most exceedingly improve the generality of our cart-horses, such as they are, over almost all England: and that, if this were done, the two-horse ploughs, the light carts, and abundance of other improvements which are now partially introduced, would become general. I am quite sure, and I think I have proved as I have stated, by actual experiments shown before our Gloucestershire Society, that greater activity can be obtained, with little or no diminution of strength and steadiness. I believe the Lincolnshire blacks would beat us at street-work, where perhaps one horse has on a turn to draw or to back a waggon-load of coals, and the like; but I contend that, for all agricultural purposes,

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power only of the team being exerted, inferior cattle may be employed, as a careful driver can make them relieve each other, and he can better apportion the weight of a load, in going over hilly roads; then, in harvest-work, a pair of horses in a waggon will clear the ground sooner than any pair of single-horse carts.—F. Burke.

my horses can do all I expect from them. I am contented with them for the present.

THOMAS JOHN LLOYD BAKER.

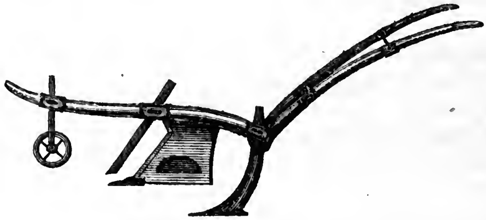
Hardwicke Court, near Gloucester,
January 14*th*, 1840.

NOTE.—Yesterday I finished another trial of the three light carts with one of my half-bred Clevelands in each. I wanted to move dung made in my stalls during the last winter to a field, where it was to be put into a heap for use. When finished the new heap measured 204 cubic yards. The distance from one heap to the other was 580 yards. The work was done in 24 hours, being 3 days and a small part of a fourth. This will seem but a small number of hours for each day, but the heaps were 2 miles from the stable, and the horses went and returned each day. They trotted back from the new heap to the old one, and there were hands enough at both to keep them always moving, but nothing was said or done to make them go beyond their usual pace. Of course the dung was nearly rotten, but moist and heavy, and, had the old heap been measured, the number of cubic yards would have been less. The diameter of my cart-wheels is 4 feet 3 inches; the wheels and axletrees are cylindrical; they are 6-inch wheels, but I am not sure, if I was to begin again, that I should recommend exactly that build.—May 30, 1840.

XLIX.—*Account of the Charlbury Subsoil-Plough.*—By PHILIP PUSEY, Esq., M.P., F.R. and G.S.

I BEG to lay, very shortly, before the Society some account of an implement which I have found to answer, so far as it has been tried, as a substitute for the subsoil-plough of Mr. Smith: and, in mentioning that gentleman's name, I need scarcely say that to the individual whose talents and perseverance establish any discovery belongs the merit, while subsequent variations, if improvements they be, flow from it almost as a matter of course. It is well known that in stirring the subsoil Mr. Smith employs first a common plough to open the furrow, and next a strong iron swing-plough, without mould-board, which is the subsoil-plough that follows the common one, and stirs the ground below the furrow to the depth of 12 or 16 inches from the surface without bringing it up. But, however valuable this discovery, whether coupled or not with thorough-draining, may on some soils prove to be, as I trust it will, still an operation so conducted requires a large employment of horse-power, and consequently an expence which may not be within the means of every farmer. The common plough which opens the furrow will of course require two horses, and sometimes three; the Deanston subsoil-plough four horses at least, and I believe oftener six, if the full depth aimed at, 16 inches, is to be reached. Indeed, in a case which comes within my own knowledge, a practical agriculturist, in calculating the expence of entering on a cold clay

farm of not six hundred acres, laid the cost of subsoiling it, apart from the draining, at the very serious amount of 1300*l.* It struck me, therefore, that possibly the discovery of Mr. Smith might be carried a little further, and be brought more within ordinary means, if we could diminish the friction necessarily incurred in passing through the unstirred subsoil, by dispensing with more parts of the common plough besides the mould-board: and I determined to try whether, by combining in one plough the two hitherto used, we might not get rid of the sole itself in the underground implement; trusting to the ordinary sole above ground for preserving the balance, and so reducing the instrument below the furrow, where the friction and resistance are of course very great, to a mere cutting or stirring tool. Mr. Hart, of Wantage, accordingly constructed for me one of his own single-wheeled ploughs, made rather stout in the beam, with a strong iron socket behind, and a simple tine fitted into it; the shape of the tine being copied from those of Biddell's scarifier, but made much thinner. This back-tine can be raised or lowered in the socket at pleasure. It is placed on the off side of the beam, in order that it may work in the middle of the fresh furrow, and so act more freely than if it were placed on the near side immediately against the unstirred land.



In order to ascertain in the first place what diminution of draught had been effected, a trial was made with Mr. Cottam's draught-gauge in a field the soil and subsoil of which are a rather strong loam. The draught of the Deanston subsoil-plough, at the depth of 16 inches, was 12 cwt.; to this must be added for the leading plough which opens the furrow 2 cwt.; making the labour of the horses 14 cwt. altogether. The draught of the new plough was between 7 and 8 cwt. With regard to the effect of the new plough, it must be remembered that the gentleman to whom we owe so much on this subject very correctly states, in his evidence given before the Agricultural Committee of 1836, that there are two distinct objects in subsoil-ploughing. The first of these is to let down the surface-water into deep drains through clefts left in the subsoil: this advantage, I hope, may be equally attained with either plough. On the other point, the thorough stirring of the subsoil and its preparation for the support of crops,

there can be no doubt that the Deanston plough is more efficient than mine; still the latter does loosen the ground considerably, and may be useful, I think, in retentive gravels, while in a really stiff clay it seems doubtful whether any subsoiling lasts very long. But I cannot speak positively, because, except in a few trials, I have only used it as yet for getting in carrots: so far, however, it has been found to answer. The ground, the subsoil of which is strong, was worked once with this plough, to the depth of 12 inches: this was done with four horses. It was afterwards gone over twice with that excellent practical instrument Biddell's scarifier, made by Messrs. Ransome; and was then, I believe, in good tilth for the purpose, to the depth which we had reached. If, however, it were desired to stir the ground more in the first ploughing, it would be easy of course to fix a spur on the back-tine, but the advantage will be attended of course with some increase in the draught. I will only add that, if any agriculturist who has land which he thinks may be improved by subsoil-ploughing be disposed to give this implement a trial, Messrs. Ransome, Mr. Cottam, and Mr. Hart have each a pattern of it; and that, when the back-tine is removed altogether, it is a serviceable one-wheeled plough. If it be intended to break into a very stiff or stony subsoil, this should be known to the maker, that the strength of the implement may be increased.

PHILIP PUSEY.

Pusey, May 4, 1840.

L.—*Experimental Improvements on the Crown Estate of King William's Town, in the County of Kerry, Ireland.*

SUMMARY OF THE KING WILLIAM'S TOWN PARLIAMENTARY REPORTS.—BY J. FRENCH BURKE, ESQ.

ABOUT the year 1821 the Lord Lieutenant of Ireland ordered a survey to be made of a portion of the Southern District, comprehending the counties of Limerick, Cork, and Kerry, chiefly with a view of improving the internal communications by the construction of new roads. The care of this was committed to Mr. Richard Griffiths, one of the government civil engineers, whose reports, in the years 1824 and 1829, stated,—that, although the eastern parts of the county of Limerick, the northern part of Cork, and the north-west of Kerry, are generally level, and composed of limestone, covered by a rich and fruitful soil, yet, between these plains, there is interposed a wild and mountainous region, extending, without interruption, from the rivers Shannon, in the county of Limerick, to the Blackwater, in that of Cork, and comprising no less than 970 square miles: equal to 620,800 statute acres. That the surface of this tract is, for the most part, wet and clayey,

interspersed with strata of coals and culm; but capable of producing excellent crops of oats, potatoes, and flax, when cultivated and manured with lime.

That throughout this entire space there existed but the one small town, or rather village, of Abbeyfeale; that it contained no resident landlord or Protestant clergyman; that it was inhabited by an ignorant peasantry, of turbulent habits; and that, in consequence of its inaccessibility, it afforded an asylum to robbers and vagabonds of every description. It was, in fact, the seat of the rebellion of the Earl of Desmond, in the reign of Queen Elizabeth, during which time the only roads ever made into it were formed, and these, being imperfectly constructed, as well as left without repair, were impassable even for horsemen in wet weather; so that the whole circuit remained, up to the time of this survey, in a nearly lawless state of nature.

In order to remedy these evils, government determined to improve this neglected waste, by laying out lines of road through the greater part of it, and building bridges; so as to render it accessible to wheel-carriages, and susceptible of cultivation.

The plan was commenced in 1822, and has been since vigorously pursued, by large grants of money from the treasury, aided by presentments from the several counties. The people, it seems, flocked to the works from all quarters, seeking for employment at any rate at which it might be offered. Their looks were haggard, their clothing wretched, and their general appearance bespoke extreme poverty; nor were they provided with any other working-tools than an ill-made spade. It must, however, be observed to their credit, that a large portion of the money which they earned has been carefully reserved for the purchase of cattle and implements of husbandry: thus affording numerous instances of poor labourers who, when first employed upon the roads, were hardly possessed of the means of life, having by their industry been enabled to rent small farms; and pointedly contradicting the prevalent notion entertained in this country, "that the Irish peasantry are an idle race." The reporter, indeed, describes them as being both violent and uncivilised, and rendered distrustful by the oppression of intermediate landlords, who hold the soil between the proprietor and the occupying tenant;* but that, when kindly treated with steadiness and justice, no people are more easily managed; and, though unaccustomed to regular exertion, they are anxious for employment, when accompanied with the prospect of reasonable remuneration.

In order to carry on such operations with any degree of success among a disorderly population, and in a district where in many

* "In many cases there are six intermediate persons, each of whom derives a profit out of the land occupied by a tenant."—*Report of* 1824, p. 6.

parts no magistrate could be found within ten or fifteen miles, it must be admitted that great caution, firmness, and good temper were requisite. These qualities, however, appear to have been eminently possessed by Mr. Griffiths; for he gradually acquired the confidence of the people, and so decidedly beneficial has been the effect of his exertions on the surrounding country, which had previously been in a very disturbed state, that it has become for several years as peaceable as any part of Ireland. On the partial completion of the roads, such rapid strides were indeed made towards cultivation, that numerous kilns were raised for the burning of lime; carts, ploughs, harrows, and agricultural implements of every description, became common; houses were built in great numbers in the vicinity of the new roads, as well as in the village of Abbeyfeale and the neighbouring towns of New Market and Castle Island; inclosures of mountain farms were also formed in every direction, and it now presents a most gratifying scene of rural industry.

During the progress of these works it was thought advisable to try some experiments on the reclamation of waste land, and a mountainous estate, called Pobble O'Keeffe—belonging to the crown—consisting of 5000 statute acres of steril bog and moor, which had been valued, under survey, at an annual rent of 4½*d.* per acre, was selected, in a situation where no species of improvement had ever been attempted. Under the authority of Parliament, the Commissioners of Woods and Forests therefore ordered a road to be cut from Roskeen Bridge, between Kanturk and Mallow, in the county of Cork, to Castle Island, in the county of Kerry; thus forming, in conjunction with the other roads already constructed, a direct communication between Tralee and Cork, passing through Killarney, and running through the centre of the crown property.

Here also was commenced the formation of a village, named King William's Town, upon the banks of the Blackwater, in which—according to the last Report of the engineer, in 1839—there have been already erected a school-house, four houses of two stories, and seven of one story in height, together with suitable offices, and a decent inn, affording accommodation both for carmen and for travellers of a superior order. Such, indeed, is the present civilization of this formerly rude province, that a stage-coach now regularly starts every morning from Tralee for Cork, and another from Cork for Tralee; and it has been ascertained that, in the course of the last year, 80,000 carts, laden with agricultural produce, timber, iron, and shop-goods, and with culm and lime, passed to and from the above towns and into the coal and limestone districts.

In order to carry the project of reclaiming the waste land into effect upon any great scale, it was first necessary to prove by ex-

periment that the object would be profitable to both landlord and tenant; as being the only sure means of inducing them to adopt the plan by the stimulus of self-interest. The first attempt was therefore made upon 4 statute acres of an unusually wet and spongy bog, of an aspect so unpromising as to appear an almost hopeless speculation. These, however, being fenced, drained, limed, and planted during two successive years with potatoes, each crop produced 5 tons per acre; and a following crop of oats yielded 135 stones, or about 47 bushels per acre.

This led to the establishment of two government farms at King William's Town: the one, as a model-farm, consisting of 379 acres; and the other, as a town farm, of 250 acres, adjoining the village. Of these it appears by the last report, dated 15th July, 1839, that, of the model-farm,—

A.	R.	P.	
93	1	19	had been reclaimed, and were then under crop, or grazing.
37	2	33	had been drained, fenced, and limed.
124	2	2	had been drained and fenced, but not limed.
13	1	2	had been planted.
21	3	33	were in process of reclamation; and
88	1	17	remained in their original state.
379	0	26	

Of the town farm—

A.	R.	P.	
101	1	11	have been reclaimed, and are now under crop, or grazing.
44	2	0	have been planted.
26	1	7	consist of reclaimable mountain; and
78	1	4	of bog, used as turbary for the production of turf.
256	1	22	

These farms, therefore, contain together 194*a.* 2*r.* 30*p.* under cultivation, exclusive of the land already planted; and the crops upon the ground were estimated at the following very moderate valuation, as being worth nearly 400*l.*, exclusive of the cost of sowing, namely:—

A.	R.	P.		£.		£.	s.	d.
9	2	38	of Turnips	at 3	per acre	29	4	3
22	2	17	of Potatoes	at 5	„	113	0	7
4	2	31	of Oats	at 3	„	14	1	7
3	0	29	of Barley	at 4	„	12	14	6
0	3	26	of Wheat	at 5	„	4	11	3
17	0	23	of Rye	at 3	„	51	8	7
2	2	18	of Vetches	at 2	„	5	4	6
84	0	0	of Meadow	at 2	„	168	0	0
144	3	22				£398	5	3

This, however, does not include the grazing land; which, if properly rated, would bring the probable estimate up to a sum equal to full 450*l.*, exclusive of the profit which might be derived from the stall-feeding of cattle: on which subject it may be incidentally observed, that, independently of its value to the land by the production of manure, the fatting of 14 small cows, fed, in 1836, upon 4½ acres of the bog land, which produced 86 tons 17 cwt. of various kind of turnips, left a clear profit of 37*l.* 16*s.*, after payment of the cost of fodder and the charge for attendance.

The expenditure, upon the reclamation of the land, was indeed considerable; but the results have been sufficient to establish the fact, that it can be effected at a rate which will return a fair profit for the sum invested: for, although the sum actually sunk upon the two farms amounts to 3085*l.*, after deducting the receipts for produce sold and the value of the stock of cattle and implements, yet their present increased annual value has been moderately estimated at 106*l.*, which is nearly equal to 3*l.* 9*s.* 6*d.* per cent.; and this at a period when the improvements are only in a progressive state, and when every year will add largely to their value, as compared with any future outlay.

The Commissioners of Woods and Forests therefore gave directions to Mr. Griffiths to subdivide the estate into farms of such extent and value as would suit the industry and capital of those who might wish to occupy them; and that, so far as possible, tenants should be selected for each who had formerly occupied any portion of the land. That each tenant, when named, should be put into possession of his farm, with a suitable dwelling-house and offices; and that his holding should be surrounded by a strong boundary fence.

In pursuance of these orders, Mr. Griffiths allotted the estate into farms of different sizes, from 30 to 80 acres, according to the nature of the soil, and the means of the proposed tenant; at the same time furnishing the farm labourers with cottages and a few acres of land. As an encouragement to industry, he also engaged that each allotment should contain, at least, ten statute acres of arable land, well drained and fenced; or that an allowance should be made for the value of the labour of enclosing and draining to that extent, and that limestone should be supplied for its cultivation. That, in return for this, the tenant was to draw and burn the lime at his own charge; and that all monies paid to him for labour should be laid out under the inspection of the resident agent of the property. The amount of cash paid to the tenant for such fencing, draining, and limestone, to be charged on the farm by an increase of rent, as follows:—

For the first seven years, at the rate of		. . .	4 per cent.
„ Second ditto	ditto	. . .	$4\frac{1}{2}$ „
„ Third ditto	ditto	. . .	5 „

and, for any additional improvements, the tenant to be allowed one-half of the value of the labour and of the cost of limestone; the rent to be, in like manner, increased in proportion to the outlay, but not to commence until one year subsequent to that in which the advance shall have been made.

In making these allotments to tenants, many of whom held land conjointly among ten or twelve families, some possessed of greater means, and others of greater industry than common, it may be justly imagined that there must have been much difficulty to encounter; but so judicious and conciliatory were the arrangemements made by Mr. Griffiths, and so impartially were the allotments distributed, that the tenancy of the whole estate was remodelled without a murmur, and every man put into undisputed possession of his farm. Thus 3180 acres of the waste were converted into 53 enclosed farms, all occupied by tenants actively engaged upon their respective lands, at rents amounting to 436*l.* per annum; and raised from a comparative state of houseless penury and idleness into that of thriving industry and comfort.

This apparently irreclaimable mountain now therefore, including the value of the farms and land in hand, actually returns a clear annual income of 700*l.*, together with stock in hand, valued at 1206*l.*, from an expenditure amounting to 10,347*l.* 13*s.* 10*d.*;* and when the turnip husbandry shall have been more widely practised, and followed, as it no doubt will by sheep-feeding, there is every prospect that the whole estate will command rents of 10*s.* to 12*s.* 6*d.* per acre. This spirited example has of late, indeed, called forth the energy of some neighbouring gentry, who are now making efforts to improve their unproductive lands; and were the non-resident landlords equally alive to their interest, there can be little doubt that the entire of this desolate tract would in the course of a few years be inhabited by a decent class of yeomanry.

During the progress of these experiments, and in consequence of the manifest improvement in the quality of the pasture land, in consequence of its being drained and limed, a dairy farm was

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* The details of these accounts are too voluminous to be here inserted, but they may be found, together with estimates of the cost and mode of drainage and tillage in the parliamentary reports upon the Crown lands of Pobble O'Keeffe and King William's Town, published 8th June, 1836, 19th December, 1837, and 8th August, 1839, which Reports are deposited in the Society's library.

commenced in 1837; in the autumn of which year ten heifers in calf, of the pure Ayrshire breed, were imported from Scotland, and a comparative trial made between them and an equal number of heifers bred from a cross between the ordinary long-horned Irish cow and a Kerry bull. From the high reputation of the Ayrshire breed, as milkers, it might be naturally supposed that their produce of both milk and butter would prove superior; yet from the very minute details carefully made by Mr. Boyan, the very intelligent superintendent of the King William's Town estate, communicated to this society, and appended to this report, it appears that from the 1st of April, 1838, to the 31st of March, 1839, and from the 21st of July to the 25th of September of the last year, the Kerrys gave not only the largest quantity of milk, but that the same quantity actually produced at the rate of about one-sixth more butter than the Ayrshire. The whole produce was sold together, and fetched the best price in Cork, without any distinction of quality; but Mr. Boyan says, in answer to a late inquiry on the subject, that the colour of both the milk and butter of the Kerry was the richer of the two.

The inferiority of the Ayrshire stock thus shown in these experiments has been attributed to the change of pasturage, and the more hardy nature of the Kerry, as bred upon their native mountains, which bear little else than heath. But although this may fairly enough account for the failure of milk during a short period, yet, when we see it continued during an entire twelvemonth, as well as during the months of July, August, and September of the following year, we think there must be something naturally in favour of the Kerry breed. The Ayrshire cows cost, in Scotland, 10*l.* each, while the price of the Irish cows, if bought in the month of November, is not more than 5*l.* to 6*l.*, or in April and May, from 8*l.* to 9*l.* each; and when fatted, their weight will average from five to six stone more than the former. The true Kerry, of the pure mountain breed, is both much smaller and cheaper, though the milk is equally rich; and if we advert to the lowness of the price, as well as to the scanty pasture on which they can be fed, they would probably be found a desirable acquisition to cottagers and farmers on poor land, or in the paddocks of gentlemen who look rather to the quality than the quantity of produce.

The following is a distinct summary of the account of the experiments which were daily entered during the whole time:—

IRISH COWS.*						AYRSHIRE COWS.†					
1838 & 1839.	No. of Imperial Quarts milked in the Month.	No. of Quarts set for Butter in the Month	No. of Quarts sold in the Month.	No. of Quarts given to Calves in the Month.	No. of Pounds of Salt Butter made in the Month.	1838 & 1839.	No. of Imperial Quarts milked in the Month.	No. of Quarts set for Butter in the Month.	No. of Quarts sold in the Month.	No. of Quarts given to Calves in the Month.	No. of Pounds of Salt Butter Made in the Month.
April.	605	76½	369½	159	8½	April.	211½	30	176½	5	..
May .	768	356	303	109	26	May .	1250¾	549½	492¾	208½	38
June.	1420	1290	115	15	147	June .	1912	1686½	186	39½	167½
July .	2097	1978	..	119	219½	July .	2159	1845	234½	79½	134½
Aug. .	1968	1968	..	..	237½	Aug. .	2016	1519	328	169	162½
Sept..	1958½	1958½	..	..	191¼	Sept. .	1604	1439	146½	18½	147¼
Oct...	1684	1684	..	..	247	Oct. .	1351	1294½	56½	..	145¾
Nov. .	883½	883½	..	..	121	Nov. .	803	792½	10½	..	85
Dec. .	705	705	..	..	114	Dec. .	582½	531	51½	..	85½
Jan. .	475½	475½	..	..	65	Jan. .	398½	359½	39	..	39¾
Feb. .	357	252½	104½	..	41½	Feb. .	191	..	191	..	4½
March	162½	16	146½	..	4½	March	166	..	166	..	..
	13,084	11,643½	1038½	402	1422¾		12,645¼	10,046½	2078¾	520	1010¼

RESULT.*

From the above Return it appears that the Total quantity milked from the Irish Cows from 1st April, 1838, to 31st March, 1839, was 13,084 Imperial Quarts, as shown in Column No. 1, of which—

11,643½ quarts were set for butter,
1038½ quarts were sold,
402 quarts were given to calves.

From the above 11,643½ quarts, (the quantity set for butter from 1st April, 1838, to 31st March, 1839), 1422¾ lbs. of salt butter were produced, being at the rate of 8⅓ imperial quarts of milk to each pound of salt butter.

RESULT.†

From the above Return it appears that the Total quantity milked from the Ayrshire Cows from 1st April, 1838, to the 31st March, 1839, was 12,645¼ Imperial Quarts, as shown in Column No. 1, of which—

10,046½ quarts were set for butter,
2078¾ quarts were sold,
520 quarts were given to calves.

From the above 10,046½ quarts (the quantity set for butter from 1st April, 1838, to the 31st March, 1839), 1010¼ lbs. of salt butter were produced, being at the rate of $9\frac{9}{10}$ Imperial Quarts of milk to each pound of salt butter.

Value of the Produce from the 1*st of April*, 1838, *to the* 31*st of March*, 1839.

	£.	s.	d.
Amount received for new milk sold	25	10	$2\frac{1}{2}$
,, ,, for skim milk sold	23	5	11
,, ,, for butter sold	86	2	6
,, ,, for calves sold	16	10	0
Total . .	£151	8	$7\frac{1}{2}$

Average rate per cow, 7*l*. 11*s*. 5*d*.

Experiments made between the 21*st of July and the* 25*th of September*, 1839.

IRISH COWS.				AYRSHIRE COWS.			
Date when Churned.	No. of Imperial Quarts of Milk set for Butter.	No. of Pounds of Butter produced at each Churning.	Result.	Date when Churned.	No. of Imperial Quarts of Milk set for Butter.	No. of Pounds of Butter produced at each Churning.	Result.
July 21	126	17		July 23	60	$5\frac{3}{4}$	
23	126	$17\frac{1}{2}$		29	288	28	
29	493	49	1 lb. of Salt	Aug. 2	247	21	1 lb. of Salt
Aug. 2	357	44	Butter is pro-	10	274	30	Butter is pro-
10	491	53	duced from the	Sept. 4	181	$18\frac{1}{4}$	duced from the
Sept. 4	326	$36\frac{1}{2}$	average of $8\frac{1}{20}$	7	162	$16\frac{1}{2}$	average of $9\frac{1}{2}$
7	356	41	imperial qrts.	13	240	21	imperial qrts.
13	354	40	of new Milk.	19	206	$19\frac{1}{2}$	of new Milk.
19	355	$40\frac{1}{2}$		25	204	19	
25	347	40			1862	179	
	3331	$378\frac{1}{2}$		Add Salt...		$16\frac{1}{2}$	
Add Salt...		$34\frac{1}{2}$		Salt Butter.		$195\frac{1}{2}$	
Salt Butter.		413					

The quantity of salt used was one-eleventh of the weight of the butter, which is 6 lbs. of salt per cask of about 72 lbs. weight.

LI.—*On the Kentish Corn-Scythe and Binding-Rake.*—By HENRY BOYS, Esq.

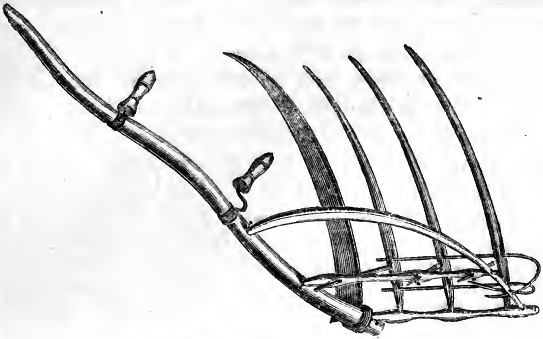
To His Grace the Duke of Richmond, President of the Royal Agricultural Society of England.

MY LORD DUKE,

I HAVE the honour of presenting to your Grace, as President of the Royal Agricultural Society of England, a Kentish corn-scythe, also a binding-rake, in the hope that the advantageous system of binding barley and oats may become more known, and more generally adopted.* I enclose herewith three sketches,—1st, of the scythe with the cradle; 2nd, of the binding-rake; 3rd, showing the latter as held for the purpose of binding.

In using the scythe for barley and oats, the great art is to leave a short "mane" or ridge of stubble, so that the ears of corn may rest thereon, and be kept from touching the ground, which is done by setting in and striking out, about five inches from the soil, taking care to swing the scythe well round, which will cause the corn to fall on the mane. The price per acre for mowing barley, when the acre yields 4 quarters, is 3*s*., with beer; and for oats a trifle less. A good labourer will mow 2 to 3 acres per day, as the growth may be large or otherwise. After the barley or oats have lain a sufficient time to ripen and become thoroughly dry, the binding-rake is brought into operation. The bands are previously made by old men, incapable of laborious work, at the cost of 4*d*. per bundle of 100 bands; or by the binders themselves, in wet weather, or before the corn is dry in the morning—the preparation of which, in such case, is usually included in the payment for binding. In order to secure as great length as possible, the bands are made from the barley or oats pulled up by the root, previous to the commencement of the harvest, and before the straw is perfectly ripened. It is generally turned over, and the mould beaten off the roots with a flail, after which it is bound in sheaves, taken to the barn, and the grain slightly thrashed off, previously to making the bands. The labourer takes the rake with both hands, as shown in the sketch (3), he proceeds to collect the corn, walking backwards, or rather sideways, his face towards the head of the rake, and the leg next thereto, keeping the straw within the rake as he steps along. As the rake fills, he lifts what he has collected on the unraked corn, until he has sufficient for a sheaf: he then throws the rake down

* Mr. Boys having presented to the Society a set of the reaping implements referred to in this paper, they have been deposited in the rooms of the Society for the inspection of the Members.



1. The Scythe with the Cradle.

2. The Binding-rake.

3. Mode of holding the Binding-rake for the purpose of binding.

with the teeth upwards, and binds the sheaf, taking hold of each end of the band—one in each hand—enclosing within it the corn so collected together, and thrusting his knee into the centre of the sheaf, in order to press it as closely as possible for binding tightly. While he is doing this, a boy, who can deliver bands to 7 men, lays one on the handle of the rake, and the man places his hand, which is next the handle of the rake, on the band, changing it, accordingly, as the row of corn to be bound may lie for him to work with the right or left hand before. The price for binding is the same as for mowing, and a man will bind as much in a day as he will mow. Towards the evening the sheaves are collected and laid together in tens, by placing four on the ground, the ears, or corn end inwards, three across them, taking care to put the corn end of the middle one in an opposite direction to the two others; two more are placed on these, and the tenth is laid on the top of all, which secures the whole from rain: the ears, or corn ends, of the two sheaves of the second row, those of the third row, and that of the top sheaf, being placed in the direction which will afford the most sunny aspect. Although I have known barley remain in the field, after being so bound and laid together, for three weeks in bad weather without injury (care being taken to replace the sheaves when blown off), it is much better, and far more prudent, to carry it immediately it is bound, in which case the sheaves are merely laid together for convenience in loading, for which purpose another labourer is needed; and this universal. After the barley is so laid together, provincially termed "shocked," the field is raked with a horse-rake, commencing with the part to be first carried; or, if the corn be carried as soon as bound, the operation of horse-raking is deferred till after the field is cleared. The great advantage attending this mode of harvesting corn is undeniable; the despatch with which a field is cleared is truly astonishing, while the labour and expence saved in carrying, stacking, unstacking, and thrashing, are alone a sufficient recommendation for its adoption.

The corn-scythe was originally intended and used solely for mowing barley and oats, but latterly a very large proportion of the wheat on poor land in East Kent has been harvested by this useful implement; which labour is performed by striking the wheat against the standing corn. It is then collected by the wife, and laid on bands prepared by the children: the man binds the sheaves in his way back, the woman carrying the scythe. The payment for so cutting wheat is 7*s.* per acre, with an allowance of four quarts of good beer per day, when the produce is about 3 quarters per acre, and 6*d.* more for every additional sack of wheat per acre. A man with his family will cut 1½ acre per

day, so that his earning will be 10*s*. 6*d*., and there is no work to be performed during the harvest more anxiously sought for by the labourer who has a family to assist him. Frequently two men, or two men with a boy, are so employed—the men relieving each other in the use of the scythe—the boy preparing the bands.

The cost of the scythe complete, which is always found by the labourer, is eleven shillings; and that of the rake three shillings and sixpence.

I have the honour to be,
My Lord Duke,
Your Grace's most obedient and
Very faithful servant,
HENRY BOYS.

Waldershare, near Dover,
April 16*th*, 1840.

LII.—*A Report of Practical Operations in the comparative Uses of the Sickle and Scythe in Harvesting Wheats.*—By JOSHUA RODWELL, Esq.

To the Secretary of the English Agricultural Society.

SIR,

THE very great and vital importance of securing our crops in good condition, and more especially the wheat crops, not only to the farmer himself, but (in this uncertain and varied climate) to the community at large, induces me to request your permission and aid in circulating, through the medium of your Journal, the results of some practical operations in the uses of the sickle and scythe in harvesting two varieties of wheat during the harvest of 1839. The following statement applies to six fields, viz.:—

	A.	R.	P.	
No. 1	21	0	0	Talavera wheat reaped.
2	30	0	0	Talavera wheat mowed.
3 and 4 . .	33	0	0	Golden drop reaped.
5 and 6 . .	16	0	0	Golden drop mowed.
	100	0	0	

Date.	Weather.	OPERATIONS.			
		Talavera Wheat reaped, 21 Acres.	Talavera Wheat mown, 30 Acres.	Golden Drop Wheat reaped, 33 Acres.	Golden Drop Wheat mown, 16 Acres.
August					
6, Tues.	fine . .	20 men reaping	. . .	20 men reaping	
7, Wed.	showery .	do. part of day	. . .	do. part of day	
8, Thur.	fine . .	do. finished	. . .	reaping	
9, Frid.	fine . .	. . .	20 men mowing	reaping	
10, Satur.	fine . .	. . .	do.	do.	
11, Sund.	7 hours' rain	. . .	. . .	. . .	
12, Mon.	showery .	. . .	do. part of day	do. part of day	
13, Tues.	light rain .	. . .	do. do.	reaping finished	
14, Wed.	showers .	. . .	finished . .	. . .	20 men mowing part of the day
15, Thur.	fine . .	. . .	. . .	. . .	mowing
16, Frid.	4 hours' rain	. . .	. . .	. . .	
17, Satur.	showers .	. . .	. . .	. . .	mowing finished
18, Sund.	5 hours' rain	. . .	. . .	. . .	
19, Mon.	showery .	wheat sprouting	. . .	wheat sprouting	
20, Tues.	showers .	do.	. . .	do.	
21, Wed.	fine . .	unfit to cart	carted . . .	unfit to cart	
22, Thur.	fine . .	do.	finished carting, in good order .	unfit . . .	carting, in good order.
23, Frid.	fine . .	carting wheat, injured	. . .	Sheaves opened, carted in the afternoon	

In the operations of mowing (using a common scythe), the division of labour to each company of twenty men was as follows, viz.: eight men mowing, eight men tying up, one man raking (using what is commonly called a drag-rake, about 6 feet long in the head, with 25 wooden teeth), one man tying up the rakings, and two men shocking, or stooking, in the sheaves; the men changing their respective employments as they find most convenient to themselves, and thus completing their work as they proceeded.

With the desire of fairly testing these different systems in a season of so much difficulty, I gave directions to my bailiff (an unwilling witness, as will be seen, in favour of scythe-operations) to furnish me with the result of his observations in writing, which I beg herewith to subjoin.

"*Buckanay Farm*, *Nov.* 1839.

"SIR,

"According to your wishes I shall endeavour to give you a short account of the proofs we had last harvest of the utility of mowing wheat, instead of reaping. We may, perhaps, live several

years and not see the thing again so clearly proved. Harvest was commenced by reaping on the two farms on the 6th of August by two companies, 20 men in each company, with Talavera wheat, at the Hall farm, and with golden drop at the Buckanay farm, and continued the same on the 7th and 8th. On the 9th the Hall company began mowing and tying up, which that company continued to do through the harvest; and the Buckanay company continued to reap the golden drop the rest of this week. Just now the weather proved very wet and showery, and we had very heavy rains, as will be recollected, from the 11th to the 20th; and, I well remember, I said to myself, 'Now will Mr. Rodwell find out the inconvenience of mowing wheat?' and people were calling out to me as I passed, 'What will become of your mown wheat now?' On the 21st you asked me in the morning if there would be any wheat fit to cart that day. I said I thought not, for I had examined the reaped Talavera, and if that was not fit I was sure the mown was not; but I shortly after found that I was mistaken; for, to my great surprise, I found the Hall company carting the mown Talavera, and to my still greater surprise found, on carefully examining it, that it was in capital condition. I examined the sheaves from one end to the other, and could find no wet or damp in them, and the bottom of the sheaf, where I expected to have found so much mischief, was quite dry. You left home on that day for two or three days, and we continued carting all that day the mown wheats, and I found to my surprise that none of the reaped Talavera wheat was fit to cart the next day; and, accordingly, occupied all the 22nd in carting the mown wheat, which was all in very good condition. On the 23rd we carted the reaped Talavera, but not in so good condition as the mown wheat, although it had stood two days longer in fine weather. The golden drop that was reaped at the same time I was obliged, now, on the 23rd, to set out singly before it was fit to cart; and after all, it was not in so good condition as the mown wheat we had carted two days before.

"And now for further proofs of the superiority of the mown wheats over the reaped; I can find amongst the reaped wheats, now we are threshing them, many mouldy sheaves and sprouted kernels, but can scarcely find one in the mown wheats. There are many other proofs of the superiority of harvesting wheats with the scythe which I need not now mention, but I could say more if required.

"I am, Sir, your humble servant,

"THOMAS SCOTCHMER.

"*J. Rodwell, Esq.*"

Hence, from the above results it will be seen that the mown wheats were not only more secure from injury during the long-continued rains, but that they were consequently in a fit state for being safely secured from all further risk two days earlier than the reaped wheats. If this result constituted the only advantage in the use of the scythe as compared with the sickle, it would alone suffice for adopting the system of mowing and tying up in preference to reaping;* but to every practical farmer it will be obvious that, with the additional quantity and value of the straw, the entire removal from the soil of all weeds and seeds (if any), and the greater facility in thus harvesting the wheat-crop (the mowing being as quickly performed, and admitting, as it does, the assistance of less efficient hands than are required for reaping), and the opportunity also of gathering in your crop more effectually—these are additional benefits not to be lightly valued.

I have the honour to be, Sir,

Your obedient and faithful servant,

JOSHUA RODWELL.

Alderton, near Woodbridge, Suffolk,
March 10, 1840.

P. S.—A very interesting article on the above subject, with some practical observations, may be seen under the head of "Harvest," in the "Penny Cyclopædia," which may be found also copied into the "Penny Magazine" for the month of August, 1839, p. 343.

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* It is unquestionably true that, from the comparatively loose tying of mown wheats, the sheaves dry much sooner than those which are reaped and bound tight after having been grasped in the hand and laid in regular order, a greater bulk of straw is naturally obtained, and the securing the corn is expedited. This, however, can only be the case where the land is clean; otherwise, the bulk of weeds, or, where seeded, of clover, severed from the ground and gathered into the sheaves, will require more time to get in order than the reaped wheats, where the sickle strikes higher from the ground.

The expense is in favour of mowing, but I am inclined to think there is greater waste; and the rakings, from lying on the ground, being more or less trampled upon, and during a protracted harvest necessarily discoloured, would, unless kept separate, deteriorate the sample, and, as *rakings*, are undoubtedly of less value.—H. HANDLEY.

LIII.—*Report on the Turnip Crop on Strong Land; including the Quality of the Land, the Quantity and Quality of Manure applied, and the Mode of Consuming the Turnips.*—By Mr. William Linton.

[Taken, by permission, from the Transactions of the Yorkshire Agricultural Society.]

The cultivation of turnips upon strong land is so difficult, and depends so much upon the seasons, that it is impossible for any one to adopt any mode from which he is not obliged in some seasons to deviate. I here give the general system I adopt, and that which answers my purpose the best.

The land which is the subject of this Report is very strong and stony, with a good depth of soil, of a fair quality, with a clay bottom, and is underdrained down each furrow.

The land intended to be sown with turnips (which is wheat or oat stubble having been sown after seeds) is ploughed the first time in November, with a very strong plough drawn by 4 horses, to the depth of 8 and 9 inches. In the spring following, as early as the weather will permit, it is ploughed again; then harrowed down with a pair of iron harrows drawn by 3 horses a breast. After this is done the land is principally tilled and cleaned by an implement which I call a cultivator. It is drawn by 4 horses a breast; both machine and horses are managed by 1 boy, which can effectually break up from 6 to 8 acres per day, and is equal to a ploughing, and in many cases much better. The plough afterwards is seldom used except to keep the lands to their usual position and height. By this means, and the use of a heavy roller to break the clods, I get the land intended for Swedish turnips ready for sowing by the beginning of May, but allow it to lay to rest and gather moisture until the last week in that month. If sown sooner they are subject to mildew, never keep so well, and are not so good in quality.

The plan adopted in sowing is to make ridges so far apart that a cart can span two of them. They are made by a common plough, with a loose mould board fixed to the left side. By this simple contrivance, we can make a ridge at once, without having to go twice in one place, which would be the case without it; the land being so strong and stony the common double mould board plough cannot be used. I then spread in each row, as equally as possible, about 14 loads of good fold-yard manure to the acre. Then divide the ridges with the plough, the same as in making them; thus covering up the manure, which is done very lightly. After which 3 pounds of seed to the acre is drilled, attaching a light roller to the drill, long enough to pass over two ridges; the one it levels and prepares for the drill, the other covers up the seed after the drill. In droughty weather the above processes are

carried on as quickly as possible after each other, so that the moisture is not lost.

The fly being so very destructive upon strong land, I find it necessary to drill not less than three pounds of seed to the acre. Thick sowing encourages the plants when young to grow much more rapidly than if sown thin; and, by drilling with the seed a compost noticed hereafter, the fly has never yet disappointed me of obtaining a good crop. In hoeing I do not attempt singling the plants the first time over, but leave 2 or 3 together, 10 inches apart; afterwards singling them with the hoe and hand, using the scruffler when necessary, just as the weeds may spring up; and if the land becomes too hard through wet and then dry weather following, so that the scruffler cannot work, the plough is used first, drawn by one horse.

The land intended for white turnips is cleaned and cultivated exactly in the same way as that for Swedish, and sown about a month after: but only 12 loads of manure is spread upon the acre; and, if sown level, not in ridges, the same quantity of manure is spread upon the land; is beat small with forks, and immediately ploughed in; then harrowed with a pair of light harrows with short teeth, or turned wrong end first, so that they may not drag the manure to the surface. The drill follows, sowing 3 rows at once, 18 inches asunder, 2½ pounds of seed per acre, and as much compost as the drill will lay on. I follow the same plan in hoeing the white turnips as I do the Swedish. The purple-topped Swedish turnips and the white Norfolk are the kinds I generally sow.

Description and Quality of the Manure.—Fold-yard manure is the kind I use, which is carted out in February and March, and laid, about 3 feet thick, in a situation most convenient for where it is intended: 6 weeks after, it is turned over, and remains in that state until wanted. The turnips are consumed by my cattle, being given in the fold-yard and houses: the manure is of good quality, as it gets all the dung from the cattle well littered down. After the turnips intended for the cattle are used, I give them from 3 to 4 pounds of linseed-cake per day; which is a further improvement to the manure.

The compost referred to as being drilled along with the seed consists of two-thirds of the best manure (particularly that from the pigs when feeding, which is kept until very rotten), one-third ashes, and one-tenth pigeon-manure;* and, if too wet to pass through the drill, a sufficient quantity of quick lime is thrown

* This compost contains the strongest of all animal manures, without doubt accelerates the growth of the plant, but can have no effect whatever in preventing the ravages of the fly.—W. Miles.

amongst it to cause it to separate. Before the drills were made sufficiently wide I found it necessary to pass it through a wide riddle. A cart-load or two of this compost is drilled upon an acre with the seed, which greatly encourages the plants whilst young, before they have sufficient root to lay hold of anything else, and is a great support when the fly is upon them.

I have used 3 or 4 chaldrons of lime to the acre, in lieu of the manure, but have found most benefit arise from the manure in the succeeding crop of clover-seeds.

The mode of Consuming the Turnips.—It has been my object for several years to pull my Swedish turnips in November, cutting off the roots and tops, giving the latter to the cattle and ewes; then carting the bottoms together, laying them in a heap or heaps near the fold-yard, about 3 feet thick, covering them with loose straw about 4 inches thick, so as to admit of wet, and in part keep out the frost, as well as the sun and drying winds in the spring. In this way I regularly preserve my Swedish turnips, and can have them in as good condition in May as I could wish for—much more so than in any other way I ever tried or heard of. After the tops are all consumed I then begin to use my white turnips; after them the Swedish, which are given to my cows, fat beasts, and ewes when lambing. If I pull up a quantity of white turnips in November, I consume the tops immediately, keeping the bottoms in the shade; but consider two months long enough to pull them before they are wanted. In February I pull off what remains upon my strong land, and preserve them the same as the Swedish, in a sward-field, for my sheep until later in the spring. By this they are prevented growing, and are much better food than those which are allowed to stand until April. I also get my sheep off the light land on which I eat the turnips much sooner, and am not thrown back in getting the land sown.

General Remarks.—I always consider it bad policy to grow turnips upon strong land with an idea of eating them *upon it*; or to pull and cart them off in wet weather: and consuming them upon good sward with cattle not only robs the fold-yard manure in quality, but also in quantity, and does no good to the sward the following summer. Since I begun to give my cattle their turnips in the fold-yard and houses my sward will graze one-third more. Where the sward is light land, dry, and of a tough nature, treading will be beneficial to it; but we are speaking of strong land.

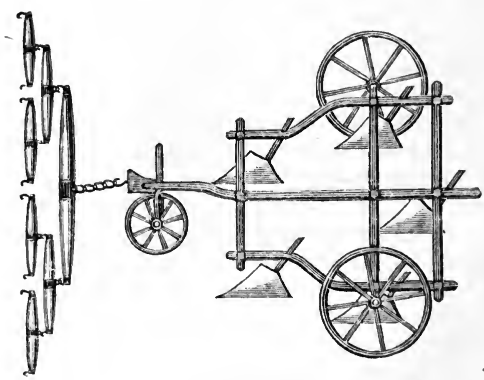
Much has been said respecting the best way of preserving Swedish turnips; and it appears that the plan of planting or paving them upon sward is one much practised, but does not give satisfaction, which I am not surprised at. I object to it for the following reasons:—first, the tops are destroyed, which are valuable if cut off in November. I consider them worth double the

expence of pulling, which costs from 7*s*. to 9*s*. per acre. Secondly, they are exposed to all the weather during winter, and when wanted are often covered up with snow, and have all to be cleansed as when growing in the field, as well as to be given to the cattle in a frozen state, which is bad management. Thirdly, the trouble and expense in paving them. By the plan adopted in this report the tops are turned to an account, the bottoms are preserved in as good condition as possible, and are always ready for use without further trouble or cost. If they are put into a house, or laid too thick for a length of time, they heat, and will become mouldy, dry, and soft. They must be kept cool and moist. Care must be taken that they do not get much frozen, after they are cut off, before carting away out of the field, and that the bulb is not cut into, either at the top or bottom.

Manure is generally considered best when rotten; in this opinion I do not agree: if it be short enough, so that the plough can cover it up with mould, it will answer as well for turnips upon strong land, if in ridges, as if it were ever so much reduced; and much better for the succeeding crop of corn. I have used bones, but did not find them to answer equally well in proportion with the cost on my strong land. The compost drilled, as described, is an excellent substitute, and can be procured at one-tenth of the cost; and, what is of the first consequence to a farmer, he has it within himself, saving both the cost and the cartage of bones, generally bought at a distance.

William Linton.

Sheriff-Hutton, near York.



The Cultivator.

LIV.—*On Animal Manures.* By Dr. Charles Sprengel, General Secretary to the Pomeranian Economical Society, and late Professor of Agriculture in the Caroline College of Brunswick.* Translated from the German.

[This paper belongs to the Theory of Agriculture.]

The substances employed as manures for our fields, meadows, pastures, and gardens, may be divided into two classes, namely, the *organic* and the *inorganic.* Among the organic manures we include whatever is derived from plants and animals; and among the inorganic, on the contrary, a variety of mineral bodies, namely, substances consisting of earths, oxides, alkalies, and acids. The materials, however, of organic manure (vegetable as well as animal) consist of the same elements as those of the inorganic, merely containing them in different proportions: thus, we find in such organic manures nitrogen, carbon, oxygen, hydrogen, lime, magnesia, potash, soda, sulphuric acid, phosphoric acid, chlorine, and, in short, all those substances which occur likewise in the inorganic or mineral manures; and this is very obvious, as plants are produced by nature from the unorganised materials of the soil and the air, and in their turn serve again for the sustenance of animals. This should always be kept in view, since it not only furnishes the best explanation of the operation of all mineral and organic manures, but also shows us how it happens that one plant is more nourishing than another: organic matters, indeed, principally become manure from the carbon, hydrogen, oxygen, and nitrogen which they contain; but that they also afford most essential service to plants by their mineral particles is evident, from the successful application of their ashes as a manure. Mineral bodies, however, are in general regarded only as stimulants—that is, as substances by means of which the vital activity of plants is increased; or it is even maintained, that their action consists principally in dissolving the organic remains of the soil, decomposing these, and converting them into the food of plants.

The excrementitious matter of animals is partly solid and partly liquid; the former passing through the intestinal canal, the latter through the urinary passages. The excrements of the intestines have, however, different degrees of solidity in different animals: in the case of the cow, for instance, they are in a half-fluid state, while in sheep and horses they possess greater con-

* Professor Sprengel's General Treatise on Manures, from which this chapter on Animal Manures has been taken, was published in Germany last year; and is stated by the author to contain the result of his researches on the subject during a period of ten years.

sistency. They are, generally speaking, the loosest in those animals which take the greatest proportion of liquid nourishment; but even the most solid excrements, as we shall presently find, still contain a large quantity of water. They contain also the remains of vegetables, but little, if at all, changed in their nature, as woody fibre, resin, wax, the green matter of leaves, and sometimes a portion of starch, besides salts of the alkalies, earths, and oxides (derived from the vegetables and water taken as food by the animals); likewise refuse secretions from the animal's own body (as mucus, bilious matter, &c.); and lastly, they contain substances of a peculiar kind, which are compounded in the body of the cattle originally, partly out of the food they have taken, and partly out of their own refuse animal secretions. The liquid excrement (namely, the urine), on the other hand, consists in a great measure of water, in which small proportions of mucus, albumen, urea, uric acid, hippuric acid, ammonia, salts of various kinds, and other bodies, are held in solution. Of these, urea, uric acid, hippuric acid, and ammonia, belong likewise to substances originally produced in the bodies of animals.

We always find that the excrements differ very much in their composition according to the kind of animal, and the kind of food supplied for its nourishment; and although this fact has been generally acknowledged, it has not by any means been enough regarded, as the treatment, employment, and action of manures depend much on these circumstances.

The following are the substances which (besides a good deal of water) have been found, by the help of chemical analysis, in the solid and fluid excrements of animals:—

1. Vegetable or woody fibre.
2. Wax and resin.
3. Chlorophyle, or the green substance of leaves, part of it decomposed.
4. Deposited humus.
5. A fatty and oily substance.
6. Mucus.
7. A peculiar brown colouring matter (in the solid excrement of oxen)
8. Vegetable albumen (hardened).
9. Animal gelatine.
10. Animal fibre.
11. Salivary matter.
12. Osmazome.

13. Hippuric acid	Originating in the urinary passages.
14. Uric acid	
15. Lactic acid	
16 Benzoic acid	
17. Urea	

18. Bilious matter.
19. Bilious resin.
20. Picromel.
21. Oxides of iron and manganese, derived from vegetables.
22. Earths (silica, lime, alumina, magnesia).
23. Salts (consisting of mineral acids and bases), derived from plants and water.
24. Common salt.

25. Carburetted hydrogen 26. Phosphuretted hydrogen 27. Sulphuretted hydrogen 28. Ammonia and 29. Hydrogen	Products of the fermentation and putrefaction of the food in the bodies of animals.

Although the number of substances already found in excrementitious matter is, as we may perceive from the foregoing enumeration, not inconsiderable, there is no doubt that many more might be discovered by a carefully conducted chemical analysis; these latter, however, being such as are formed originally in the bodies of animals.

The value of animal excrements as manure is, as has been already previously mentioned, very different, and depends upon the age of the animals, their kind, their mode of being employed, the kind and quantity of food, and the water which they get to drink.

Age.—That the value of the excrements, under similar circumstances, must depend much on the *age* of the animals, is very natural; for young animals require phosphoric acid, lime, and nitrogen for the formation of bone, and it can only be from their food that they obtain them. The excrements of a young beast, therefore, cannot contain so much of these materials as those of a full grown one—a deficiency which one would suppose must be felt when they are applied to crops such as wheat, barley, beans, clover, and turnips, which require much phosphoric acid, lime, and nitrogen for their perfect development. For the formation too of the bodies of young animals, besides these three substances, there is also much carbon, hydrogen, sulphur, chlorine, and soda required; and as the whole of these elements are abstracted from the food by the digestive functions, it is easy to be conceived, that since they are all requisite for the nourishment of plants, especially for nutritious plants, the excrement of young animals can never have so great a value as that of full-grown stock, as the latter retain so much only of the substances in question as is necessary to repair waste and expulsion. Indeed, it has been long known that the manure from young stock is the worst.

Kind.—The kind of the cattle affects the value of the excrement, inasmuch as some of them seize upon this or that particular element

of the food, or retain it in the body: cows, for instance, require, as it would seem, for the chemical constitution of their body, or for the formation of milk, more nitrogen and phosphate of lime, &c., than sheep; and the latter require again more sulphur, common salt, &c., for the formation of their wool; the excrements of oxen, consequently, cannot contain so much nitrogen as those of sheep, while they are more abundant in salt and sulphur. Partly, however, the value of the excrements of different kinds of animals depends on their digestive organs, as well as on the finer attrition of the food in the process of chewing. Sheep, having stronger digestive organs than cows, on that account exhaust their food more completely, and they are also able to abstract from it more nutriment in consequence of the finer state to which they reduce it in chewing. With food, therefore, of the *same* kind, the excrements of sheep cannot be of so much value as those of oxen; if they act more quickly, this arises from their being sooner decomposed in consequence of being more finely divided. Experience indeed teaches us that sheep manure produces its effect more speedily, but by no means so permanently as the manure of oxen.

Mode of Employment.—That the mode of employing the animal must also have a considerable influence on the goodness of their excrements, is very natural to be supposed; cows which are milked cannot furnish excrements of so good a quality as cows which are not either in milk or in calf, for substances must be supplied for the production of the milk and for the growth of the young in the body of the mother, which the food has yielded, and these are the very substances which are the most powerful as manures, namely, nitrogen, sulphur, phosphorus, chlorine, and soda. Draught-oxen (in Germany) which remain quiet in the stall during the winter, when fed in the same manner as cows, always give better dung than the latter, provided they are not improving in condition, for if they are improving, then the food helps to form flesh, which contains almost the same substances as the milk does. Wethers, under similar circumstances, give better manure than ewes, for the former produce only wool, while the latter furnish also milk, or nourishment for the lamb, for which, the food has yielded the materials. Since the materials of the food, therefore, are differently appropriated in the formation of wool, flesh, fat, bones, and milk, and since the excrements result from the food, it is very natural to suppose that the different employment made of the animals must have a considerable influence on the value of their excrement.

Kind of Food.—The *kind of food,* however, has undoubtedly the greatest influence on the goodness of the excrement. When animals are so badly kept that they daily lose flesh, their ex-

crements also become lowered in quality in the same proportion, since the body in such case not only expels fewer of its own worn out particles, but the food itself also becomes more powerfully exhausted by the digestive organs. If, on the contrary, the animals are kept on abundant and nourishing food, their excrements also are very strong in quality, for these will not only contain much refuse animal matter, but the food itself also is less exhausted. Hence the manure of fattening stock is the best. Animals immoderately fed give, indeed, for reasons which do not require explanation, the most powerful manure, with the disadvantage, however, that the food has not undergone a proper change. Accordingly, the more nutritious in general the food is, the better are the excrements resulting from it, supposing the animals to obtain so much of it, as to gain instead of losing flesh and fat; for the excrements resulting under these circumstances are abundant in phosphorus, sulphur, soda, potash, chlorine, lime, magnesia, and nitrogen. Fatting stock, as we learn by experience, yield very strong manure when they are allowed the free use of salt; and this is natural, for by the addition of the salt the manuring substances are increased. It is likewise maintained that the excrements of oxen fed on scalded fodder are of superior quality to those of stock fed in the ordinary manner: this, however, is scarcely possible; they must, on the contrary, with equal quantity and quality of food, be inferior, for by the process of scalding, the materials are so prepared for the digestive organs as more easily to yield their best portions to them. For this reason we give cows a less quantity of the scalded fodder than of that which has not been so prepared. The excrements of oxen fed on scalded food come sooner into effective operation, since the woody fibre and the hardened vegetable portions of the food are softened by the process of scalding, and, consequently, when in the state of excrement, are decomposed more rapidly. On account of this quicker effect, the excrement of cattle fed on scalded food is supposed to be the best, though it is not really so.

Water.—The *water,* lastly, furnished as drink for the animals has also some influence on the goodness of their excrements; for as a single ox drinks daily 80 and more pounds of water, and there exists frequently in this quantity from half an ounce to an ounce of saline matters, consisting of gypsum, common salt, phosphate of lime (dissolved in carbonic acid), carbonate of potash, carbonate of lime, and carbonate of magnesia, it results, if we reckon a cow in the course of a year to furnish manure for a German acre and a half (that is, about one English acre) of ground, that 10 pounds per German acre (that is, 16 pounds per English acre) of these

salts will be supplied by the water taken as drink, and, although it must be allowed this is not much, it deserves at the same time to be taken into account.*

It has been also maintained that the state of health of the animal may have a considerable influence on the goodness of the excrements, and that they will be so much the better the healthier the animal may be; no sufficient reason is, however, advanced for this assertion, for the stronger and healthier the animals are, the more do they exhaust the food given to them of those materials which are the best manures, as nitrogen, sulphur, phosphorus, chlorine, &c. There does indeed exist a difference between the excrements of cattle in summer and winter: when the summer is very hot the process of digestion proceeds unfavourably, and as a natural consequence the food is less exhausted: on the other hand, when the weather is cold the animals have a better digestion, and on that account abstract from the food more of its nourishment, or (what amounts to the same thing) more of its manuring elements.

It may always be regarded as an indication that the excrements of animals contain many powerfully manuring substances when they pass quickly into the putrefactive state, and develop a large quantity of the offensive gases and ammonia; for in such cases they contain, not only much sulphur, phosphorus, and nitrogen, but an abundance also of chlorine, soda, potash, lime, and magnesia; the whole of which, as we already know, are so much the more important in vegetation, as the soil manured with the excrements is deficient in these particular substances.

I.—ON THE EXCREMENTS OF NEAT CATTLE.

The ox yields more *liquid* than *solid* excrement; and as the former plays a more important part almost than the latter in the preparation of common yard manure, (consisting of excrements and straw,) it is obvious that we should acquaint ourselves in the most exact manner with the properties of each.

Solid Excrements.—If we weigh the dry food given the cattle to eat, and also dry and weigh the resulting excrements, we shall find the weight of the latter considerably less than that of the former. Block, who has lately made a great number of experiments on this circumstance, found that 100 lbs. of rye-straw yielded only 43 lbs. of dried excrement (liquid and solid) while 100 lbs. of hay gave 44 lbs. Food which contains many watery parts furnished, as may be naturally supposed, a still smaller proportion: thus, for instance, 100 lbs. of potatoes gave only

* The Brunswick acre is here assumed to be $\frac{5}{8}$ of the English acre.

14 lbs.; 100 lbs. of mangold-wurzel, 6 lbs.; and 100 lbs. of green clover, $9\frac{1}{3}$ lbs. of dried excrement. Now, even if we assume that some small degree of error may attach to these experiments, the circumstance under consideration is on the whole very remarkable, and leads to the question:—Where does the deficiency of weight remain, since only a few pounds, perhaps, of the food have been converted into flesh, fat, cheesy matter (in the milk), &c.? We may be allowed to assume that, in the first place, the hydrogen and oxygen of many vegetable substances unite in the process of digestion to form water—a supposition which receives confirmation from the fact that cows not only give out much water in urine and milk, but that they also exhale much aqueous gas by the skin, and still more of aqueous vapour by respiration from the lungs—secondly, that a portion of the carbon of the food will pass off in cows, as in other animals, under the form of carbonic acid gas, in the breath; and thirdly, that many of the elements of the food, as sulphur, carbon, hydrogen, nitrogen, phosphorus, and oxygen, assume the form of gas, and escape through the skin or rectum, as carbonic acid, carburetted hydrogen, sulphuretted hydrogen, phosphuretted hydrogen, and ammonia.

It follows now, from what has been already said, that the solid excrements of cattle must be very differently composed, according to the different food supplied to the animals, that they contain one class of ingredients if foddered on straw, another kind if fed on green clover, and another still if potatoes, mangold-wurzel, &c. be given to them. The solid excrements of cattle have indeed been frequently subjected to chemical analysis, but up to this time we possess none which is properly exact. It is indeed very difficult to supply one, as many of the bodies themselves undergo decomposition during the investigation.

Einhof was the first who chemically investigated the solid excrement of cattle. He found that 1000 parts, by weight, of the excrement of cows which had been fed on spurry, consisted of the following ingredients:—

	Parts by weight.
Water	717
Substances insoluble in water, composed of green mucous matter	93
Substances soluble in water, composed of bitter matter, with potash and phosphate of lime	23
Vegetable fibre	156
Sand (which must have adhered to the spurry)	11
Total	1000

Morin, a French chemist, afterwards investigated the solid excrements of cows which appear to have been fed on dry food: 1000 parts, by weight, consisted of the following substances:—

	Parts by weight.
Water	700
Vegetable fibre	241
A green fatty substance and resin (half decomposed green matter of leaves)	15
A yellowish sweetish substance, probably sugar of gall (picromel)	6
A brown shining substance without any particular smell, almost tasteless, and soluble in water; named by Morin "*bubulin*," (most probably contains nitrogen)	16
Coagulated albumen	4
Brown resinous substance (bilious resin)	18
Total	1000

The solid excrements of cows which appear to have been fed on green food were found, by the same chemist, to be composed as follows:—

	Parts by weight.
Water	712
Vegetable fibre	228
Green fatty substance	16
Sugar of gall	6
Bubulin	19
Coagulated albumen	7
Resinous substance	12
Total	1000

Zierl, also, has the merit of having subjected the solid excrements of cattle to a chemical analysis. According to him, animals fed on potatoes, beans, straw, and hay, gave excrements having the following composition:—

	Parts by weight.
Water	754
Sugar of gall and some soluble salts	11
Bilious and extractive matter	11
Deposited humus (starch?), with coagulated mucus and albumen	83
Vegetable fibre and remains of the food	141
Total	1000

1000 parts, by weight, of the dried excrements, when burnt, gave 60 parts, by weight, of ashes, which contained the following substances:—

	Parts by weight.
Silica	44
Carbonate and phosphate of lime	12
Carbonate, sulphate, and muriate of soda	2
Total	58

The two deficient parts consisted, probably, of magnesia, alumina, iron, manganese, and potash. The solid excrements of cattle are by no means so liable to undergo quick decomposition, and, consequently, when collected into heaps to become heated, as are those of sheep and of horses; on which account, they remain longer in the ground, and produce their effects more slowly. The principal reason for this is, that they contain so very small a proportion of substances, having nitrogen for an element, the chemical analysis already quoted showing, at the most, an amount of only 1 per cent. of such substances (albumen): the slow decomposition, however, depends partly on the vegetable remains having been less finely divided, and partly on their greater quantity of moisture which retards the process; for if a certain degree of warmth is developed by their decomposition, it immediately becomes chemically combined with the evaporating water. For the reason that they contain very few substances possessing nitrogen, they develop, during putrefaction, no ammonia; for when such ammonia occurs, it is immediately united with the humic acid formed in the mean time. That humate of ammonia does exist in the solid excrements of cattle during fermentation, we ascertain by the disengagement of the ammonia on treatment with caustic potash, or lime. As the process of decomposition goes on slowly, they absorb but little oxygen from the air, and consequently disengage less carbonic acid gas than the excrements of sheep. On the other hand, the solid excrements become more speedily decomposed when mixed with the fluid ones; for as these last contain many substances into the composition of which nitrogen enters as an element (as mucus, albumen, and urea), they disintegrate the vegetable fibres, and aid the process of putrefaction in the remaining solid bodies.

Although the putrefaction of solid excrements is essential for the conversion of all the solid matters they contain into food for plants, it ought never to take place on the surface of the ground, as a great quantity of the manuring matter, in that case, assumes

the state of gas. Professor Gazzeri, of Florence, found, for instance, from experiments on a small scale, made expressly on this point, that solid excrements of cattle undergoing putrefaction in the open air, lost 5 per cent. of their substance in a space of forty days. Now, although in this respect the case of excrements which lie in manure pits is somewhat different, as the oxygen of the air has less free access under these circumstances, there was in Gazzeri's experiments a waste sufficiently great to show that it is not profitable either to allow the excrements to lie long in manure pits, or to employ them as a top-dressing. They are, however, seldom made use of alone, but generally mixed up with straw and urine into common yard-dung, and in that state applied to the field.

Liquid Excrements—(Urine in its recent and in its decomposed state).—The urine is separated in the kidneys, and proceeds thence into the bladder, which evacuates it when full. It is by means of this fluid that by far the most of those parts which have become useless are removed from the body of the animal. This is the reason that it is so excellent a manure. In the kidneys, however, there is originally formed out of the animal particles a wholly peculiar class of bodies, as urea, uric acid, hippuric acid, benzoic acid, &c.

Fresh urine of cattle has a yellow colour, occasioned by a small quantity of resinous colouring matter; but on standing a longer time exposed to the air, it assumes a brown, and even at last, a black colour; this is to be ascribed to the formation of humic acid, from the organic bodies which are passing into decomposition.

In summer, fresh urine of cattle always contains a portion of ammonia, while in winter it does not possess a trace of it; hence we see that in hot weather the urea, which is the principal source of ammonia, undergoes decomposition while remaining in the animal body. Urine which has been exposed for a year and a half in contact with the air, no longer contains any organic remains, but salts only, or mineral bodies dissolved in water; and as it is still endued, nevertheless, with strong manuring properties, this proves, as I have elsewhere observed, that we must reckon minerals among the real means of food for plants. When urine is applied, in its fresh state, to living plants, it either speedily destroys them, or brings them into a sickly condition—an effect resulting from the excess of caustic ammonia which the fluid contains; the urea, too, ought to bear a part of the blame, since it is very difficult, as has been already remarked, for plants to assimilate organic matters, unless such matters be dissolved in a large quantity of water. For this reason we allow the

urine to become putrid before making use of it, in order that the urea may be decomposed, and the caustic ammonia converted into the state of carbonate, humate, or acetate of ammonia. On this point I shall have more to say hereafter.

The urine of oxen has already been many times chemically investigated, and by myself among others. Its component parts naturally vary, as in the case of solid excrementitious matter, according to the food given to the animal.

The English chemist, Brande, was the first who investigated this fluid; he found that 100 parts, by weight, were composed as follows —

	Parts by weight.
Water	68
Urea	4
Carbonate of Ammonia	4
Sulphate of potash	6
Muriates of ammonia and lime	15
Phosphate of lime	3
	100

We can have no hesitation in asserting that this analysis is incorrect, for there is never found in urine which still retains urea, and has, accordingly, undergone only a partial putrefaction, an amount of 32 per cent. of solid matter. When urine, on the contrary, stands exposed for a long time in contact with the air, the amount of water it contains is diminished by evaporation, and the proportion of the solid matter becomes then naturally greater. Now, such urine may probably have been that which Mr. Brande examined: he has, however, overlooked many other bodies occurring in this fluid, particularly soda and lime.

According to my own careful analysis of the fresh urine of cows fed in a pasture abounding with good nourishing grass, several kinds of clover and vetch, a mixture of field fennel and plantain, much dandelion, hawkbit, and a great proportion of common daisy, 100,000 parts, by weight, were found to be composed as follows :—

		Parts by weight.
Water		92,624
Urea, along with some resinous colouring matter		4,000
Albumen		10
Mucus		190
Benzoic acid (hippuric acid)	Combined with potash, soda, and ammonia, forming salts	90
Lactic acid		516
Carbonic acid		256
Ammonia		205
Potash		664
Soda		554
Sulphuric acid	Combined with soda, lime, and magnesia, forming salts	405
Phosphoric acid		70
Chlorine		272
Lime		65
Magnesia		35
Alumina		2
Oxide of iron		4
Oxide of manganese		1
Silica		36
	Total	100,000

Urine contains in winter very much less, often scarcely half this quantity of urea, and is then, of course, much less valuable as manure. It also contains less manuring matter the more water the cows drink—a circumstance to which attention must be paid. In summer fresh urine (that is, the urea, mucus, and albumen, held by it in solution,) passes very quickly into a state of putrefaction, and much ammonia is consequently developed in the form of gas; likewise carbonic acid, and a portion of sulphuretted and phosphuretted hydrogen, which likewise partly assume the gaseous state. The last two gases are the cause of the intolerable odour of putrifying urine. The caustic ammonia arising in every case from the decomposition of the urea and the other organic bodies of urine which contain nitrogen, remains partly dissolved in water, and is the substance through which urine not properly putrefied is so apt to injure plants. If, on the contrary, the urine remains a long time exposed to the air, the caustic ammonia absorbs from it carbonic acid, becomes mild, and the urine may then be employed without danger as a manure for vegetation. That the putrefied urine actually contains much carbonic acid combined with the ammonia, we find by mixing it with mineral acids, when strong effervescence ensues.

A chemical investigation of cattle urine, which had been exposed to the air for a month to putrefy, and had lost very little by

evaporation, exhibited the following as the composition of 100,000 parts by weight:—

		Parts by weight.
Water		95,442
Urea, along with a portion of resinous colouring matter		1,000
Albumen		000
Mucus		40
Benzoic, or hippuric acid	Combined with potash, soda, and ammonia, forming salts	250
Lactic acid		500
Acetic acid		1
Carbonic acid		165
Ammonia, occurring partly in an uncombined state		487
Potash		664
Soda		554
Sulphuric acid		338
Phosphoric acid		26
Chlorine		272
Lime		2
Magnesia		22
Sulphuretted hydrogen		1
Silica		5
Oxide of iron		1
Sediment, (consisting of phosphate and carbonate of lime and magnesia; alumina, silica, and oxide of iron, and oxide of manganese)		180
Total		100,000

Thus, if the urine of cattle, which has been putrefying for a month, contains more than as much again of ammonia as urine in its fresh state, it would obviously have contained a still greater proportion, if some of it had not evaporated during the time; and that this escape of the gas actually did take place was made evident, not only from the smell, but also on the application of chemical tests; for instance, by holding muriatic acid near it, when a dense white vapour (of sal-ammoniac), in every case, immediately ensued. The ammonia, which escapes in the form of gas, naturally occasions a direct and not inconsiderable loss of that element to which the putrefying urine owes its principal action as a manure; so that it is of importance to add to the decomposing urine some substance containing an acid principle, which not only combines with the ammonia as it becomes gradually developed, but also neutralises it. We can employ for this purpose a substance, generally very easy to be obtained, namely, humus, which contains much humic acid, or we may also make use of green copperas (proto-sulphate of iron), or the alum of

commerce; the latter article having this advantage over the copperas, that it considerably strengthens the action of the urine by the alkali which it contains: the objection, however, to both these commercial articles is their expence, if they are to be used in sufficient quantities to neutralise the whole of the ammonia. In the Black Forest, and in Switzerland, green copperas is generally used in the preparation of the liquid manure, termed "gülle," without, however, a knowledge of the peculiar properties on which its effects depend—a circumstance of common occurrence in other very judicious and appropriate processes in the arts, accident having led men to their adoption. It is not, however, employed by any means in sufficient quantity to neutralise the whole of the ammonia formed; but the addition has its effect principally in strengthening the manuring properties of the gülle.

In Belgium, Switzerland, and many other countries, the urine, before being exposed to fermentation and decomposition, is mixed with an equal quantity of water; and experience has proved that this dilution is attended with much advantage. The reason of this will be instantly perceived by those who are acquainted with the properties of water and ammoniacal gas. Water absorbs only a certain quantity of this gas, and the less of it, the more of other substances it already holds in solution: if, therefore, the urine is mixed with an equal quantity of water, it is enabled to absorb more than as much again of the ammoniacal gas, and no further escape of the gas takes place, at least in no considerable degree, provided the liquid be kept in a cool place.

There is another advantage—that the larger quantity of liquid is now able to retain more of the carbonic acid developed within it, and even to attract some from the atmosphere, and this acid, becoming chemically combined with the ammonia, renders it mild, or neutralises it. Lastly, the greater bulk of the liquid enables it to absorb a greater quantity of sulphuretted hydrogen gas, and on this account urine diluted with water contains more sulphuretted hydrogen than unmixed urine does. Many experiments made by me on this particular point confirm these observations most completely; for 100,000 parts, by weight, of urine mixed with 100,000 of pure water, and this mixture exposed for four weeks to putrefaction, consisted (without reckoning the water which had been added) as follows:—

	Parts by weight.
Water	93·481
Urea, along with some colouring matter	0·600
Albumen	0·000
Mucus	0·030
Benzoic, or hippuric acid	0·120
Lactic acid	0·500
Acetic acid	0·020
Sulphuretted hydrogen	0·030
Carbonic acid	1·533
Ammonia	1·622
Potash	0·664
Soda	0·554
Silica	0·008
Lime	0·008
Magnesia	0·030
Chlorine	0·272
Sulphuric acid	0·332
Phosphoric acid	0·146
Sediment (consisting of carbonate and phosphate of lime, and magnesia, alumina, silica, oxide of manganese and iron)	0·150
	100·000

It results from this experiment, that the urea does not become wholly decomposed in the course of four weeks, not even when, as was the case in this instance, the temperature of the air is between 68° and 72½° F.; accordingly, if the complete decomposition of the urea be required, the urine and water should not be applied as a liquid manure for meadows, clover-fields, &c., until a period of six or seven weeks has elapsed, especially as the liquid, before the expiration of this time, also contains much ammonia still in a caustic state, and is therefore highly injurious to vegetation; and experience is, in general, found to confirm this view. The addition of the water to the urine has also, as we perceive, this further advantage—that the diluted liquid contains nearly four times as much ammonia as urine left to putrefy in its natural state, although it retained only 0.4 less of urea. In the case of 100,000 pounds of urine, diluted with water, and left to putrefy, there were obtained, in consequence of such dilution, 1135 pounds more of ammonia—a circumstance of the greater importance, as this quantity contains 936 pounds of nitrogen, an element which acts so essential a part in the nourishment of plants. If we reflect that a cow in the course of a year furnishes, at least, 15,000 pounds of urine, and that from such quantity no less that 162 pounds of ammonia, worth, at

least, 10 rix-dollars (2*l.*), are every year lost in the common mode of preparing the urine; and reckon the expense of distributing such 15,000 pounds of water over the field at 2 rix-dollars (8*s.*), a balance of 8 rix-dollars (32*s.*) per cow will still be left, supposing, of course, that all the urine which a cow furnishes reaches the tank. It is true that the addition of the water is superfluous, as has already been stated, if we supply the tank with a sufficient quantity of green copperas; but as so large a quantity of the copperas is required, the expense of the manure so prepared is too much increased; for 23 pounds of ammonia require 53 pounds of sulphuric acid to effect its saturation, and 100 pounds of copperas contain only 29 pounds of sulphuric acid. In order, therefore, to saturate perfectly those 162 pounds of ammonia, 373 pounds of sulphuric acid, or 1286 pounds of green copperas would be required. Although, therefore, sulphuric acid is a powerful manuring body, as is shown in gypsum, and although so large a quantity be not necessary as is here calculated, in consequence of the lactic, acetic, and hippuric acids neutralising a part of the ammonia, it is nevertheless too expensive, and the addition of water is the mode which deserves the preference, provided no earth, abundant in humus, is at hand, to effect the retention of the volatile ammonia. Ninety pounds of humic acid are necessary for the saturation of 10 pounds of ammonia; but as earth, however rich in humus, seldom contains more than 45 per cent. of humic acid, every 10 pounds of ammonia will require 200 pounds of dry humus, and, consequently, the 162 pounds in question would require more than 3000 pounds. Opportunities may sometimes occur for the preparation or cheap purchase of wood-vinegar; and this acid, added from time to time to the putrefying urine, likewise prevents the escape of the ammoniacal gas. Seventy pounds of acetic acid saturate or fix 30 pounds of ammonia: it must be recollected, however, that vinegar, prepared from wood, as well as that from other sources, often contains, besides acetic acid, upwards of 50 per cent. of water. The acetate of ammonia, like the humate and sulphate, belong to the most powerful class of manures.

When cattle-urine is left for three months or longer in the tank, a considerable portion of the carbonate of ammonia formed in it is lost, for the carbonate evaporates as well as the caustic ammonia, though more slowly. A small quantity of carbonate of ammonia is also continually evaporating from urine even when mixed with water, and therefore when the caustic ammonia has been rendered mild by its conversion into carbonate, no time should be lost in applying it as a manure to growing plants. The escape of the volatile ammonia, however, is prevented the most completely when

the urine is mixed with humus, and then either left to putrefy or laid on the field and immediately ploughed in. Urine, five or six months old, contains not a trace of its original urea, mucus, and albumen; on the other hand, there are found in it carbonate, sulphate, and humate of ammonia, humates of lime and magnesia, common salt, and also some benzoate, lactate, and acetate of ammonia. The lactic, acetic, and benzoic or hippuric acids which belonging to the class of organic bodies, do not injure vegetation, being united to the ammonia, and therefore in some measure incorporated as inorganic matters.

In Belgium it is the practice, in order to strengthen the manuring property of urine mixed with water, to add rape-cake to the liquid, and allow them to putrefy together in the tank. The rape-cake contains many substances (of the nature of vegetable albumen) having nitrogen as one of their elements, which develop accordingly much ammonia on their decomposition; also a considerable quantity of carbonic acid, which immediately combines with the ammonia of the urea, as well as with that of the rape-cake, and renders it less volatile. This acid likewise neutralises the caustic qualities of the ammonia, converting it into a beneficial manure. The addition of rape-cake to putrefying urine diluted with water deserves, on account of these advantages, to be practised in other countries. Some indeed think that the water, because it becomes putrid, is a manure; but this is not the case, for it is not the water that putrefies, but only the organic matters held by it in solution; the bulk however of the liquid serving the purpose, as we have seen, of absorbing and retaining the gases developed during putrefaction. Instead of the rape-cake, we might indeed add to the tank many other vegetable substances yielding much carbonic acid on decomposition, particularly such as are in a green state, as weeds from the garden and fields.

If urine has not been mixed with water, and contains a certain quantity of solid excrement, it is said to be a sign that it has acquired its proper maturity in the tank when no further scum or froth arises to the surface even when the liquid is stirred up. No doubt, this is a certain proof that the fermentation of the urine is completed, and that it may now be applied without injury to growing vegetables; for the scum, or bubbles, are occasioned by the carbonic acid, which cannot even begin to escape until it has saturated all the ammonia present.* Still although urine which froths, no longer contains caustic ammonia, and consequently is no longer injurious to vegetable life—how much ammonia up to the

* A scum is also formed on the surface of the urine at the commencement of the putrefaction; but this immediately ceases when the urea passes into decomposition; ammonia being then produced, which will combine chemically with the carbonic acid.

moment when this is the case has escaped in the form of gas, and how much of the choicest manuring element has been up to that point lost by the urine! On this consideration we should at once hasten to convey the urine *as fresh as possible* to the field, but to a field which has no crop on it. In fact, whoever is obliged, for want of straw, to collect the urine separately,—whoever, if he be compelled to do this, mixes no water with it, or who fails also to employ some neutralising substance to combine with the ammonia which is produced in so great a degree during the summer, suffers a loss of manure which exceeds all belief! It is indeed only a gaseous substance, and not a solid material visible to the eye, which thus escapes and is lost; but for all that it is of greater importance to the nourishment of plants than perhaps any other portion of the excrements.

It is a common supposition that urine, in order to lose its caustic qualities, should putrefy in summer for five or six weeks, and in winter (provided the tank be well covered in) for eight or nine weeks; but no fixed rules can be laid down on this point, as the quicker or slower rate of putrefaction depends upon the temperature of the air. The ripeness of the urine for manuring crops is arrived when it contains neither caustic ammonia nor urea; a circumstance however which can only be ascertained with certainty by a chemical investigation. If we add, for example, a small quantity of sulphuric acid to the urine, and there should arise, after a few moments, a gentle effervescence, we may assume that all the ammonia is saturated with carbonic acid: should, however, the effervescence ensue only after the addition of a further quantity of sulphuric acid, we may hence conclude that the urine still contains caustic ammonia. From the quantity of sulphuric acid required to effect this effervescence or disengagement of carbonic acid, we may further draw an inference of the amount of ammonia still remaining in the urine uncombined with carbonic acid, as the sulphuric acid in the first instance saturates the free ammonia before acting on that which is combined with carbonic acid. By means of a strip of blue litmus paper we may ascertain whether the whole of the carbonate of ammonia has been seized upon by the sulphuric acid; for when the paper is turned permanently red, the sulphuric acid has not only taken the whole of the ammonia into combination, but an excess of the acid is then present.

Properly decomposed urine is most frequently applied for the manuring of meadows and of clover and lucern fields; in meadows destroying the moss, which, as my own experiments show, cannot in any case resist the ammonia of the urine: it is led also in autumn, winter, and spring, upon the rye-crops and in Belgium even upon the barley and rape when they are a foot high or

more. It is most adapted for giving an impulse to a weak and sickly crop in its early state; indeed it may be applied with advantage to every kind of crop, but it never produces so good an effect before sowing as when the plants are in some degree grown —for this reason, that the carbonate of ammonia, when no vegetation is present to take it up, is either uselessly evaporated or washed away by the rain-water. It is always more efficient on light sandy soils than on clays and strong loams, especially when the latter are moist. This fact is easily explained by the circumstance that urine requires a longer period to penetrate clay soils, so that in the interim much of its carbonate of ammonia escapes as gas. For the same reason it is very unprofitable, as experience has often proved, to lead urine on the field during a black frost; for, when it becomes frozen before being absorbed by the earth, the greater part of the carbonate of ammonia will escape in the course of a few days. When the ground is covered with snow, on the contrary, it can be more easily applied, but it is always better to wait until the ground is again open; for then the urine is rapidly absorbed by the soil, and the whole of the ammonia generally meets with so much humic acid that it becomes at once neutralised and fixed in the resulting humate of ammonia. If we would see the rapidity with which even the solid carbonate of ammonia volatilises in winter, we have only to lay a weighed portion of it in the open air, and weigh it again a few days afterwards. Urine has another advantage on light sandy soils, namely, its binding them, in some degree, into a more consistent state; while imperfectly decomposed dung, on the contrary, only renders them still lighter. Many persons, too, think, that cattle-urine contains salts which attract moisture from the atmosphere, and thus render an essential service to crops on a dry sandy soil: this however is a mistake.

A great but not sufficiently estimated advantage which arises from manuring with urine, consists undoubtedly in the quicker return effected on the capital of manure in consequence of its being applied to plants already in a growing state. In the case of manuring with solid excrements, a period of two or three years may elapse before complete decomposition ensues, and the plants have derived the full advantage. The crops, too, during this period, lose much of the manure in consequence of its best portions being drained away by the snow and rain water. When we manure, on the other hand, with urine, its salts and manuring elements are consumed by the plants in a few months. To manure, however, with urine, in the proper quantities, is a point not easy to hit, and we may easily apply too much of it or too little. It is likewise difficult to effect its equal distribution over the field, however good the measures may be which we take for the purpose. In

Belgium it is ladled out of a water-proof sheet stretched upon the waggon, and is flung over the surface of the field by means of wooden scoops; while in Germany they cart it on the field in barrels, and effect its distribution either by means of swallow-tails (as they are called) placed at the back part of the cask, or of boxes perforated with holes, and hung below the vessel.

In the application of the urine the greatest caution will always be required not to allow too great a quantity to be used on the land: this, however, is least to be apprehended when the soil is rich in humus, for any small quantity of caustic ammonia that may exist in the urine will then be neutralised by the humic acid of the soil; and less injury may be feared when it is applied to the crops or pastures in wet weather, and is diluted by the rain-water. The quantity to be applied to a Magdeburg acre (that is, to about two-thirds of an English acre),* is different, and varies from 20 to 25, or 30,000 lbs. by weight. On sandy soils, where it comes sooner into operation than on the clays, and where the roots of plants are enabled to ramify with less obstruction, the quantity amounts in general to 18 or 20,000 lbs. Its effect lasts for one year only; which might be expected, because all its manuring parts are soluble in water, and, consequently, are either soon taken up by the plants or washed away by the rain. From 20,000 lbs. of urine, which has putrefied 5 or 6 weeks, the German acre (two-thirds of the English) obtains only 800 or 900 lbs. of actual manure. In the case of previous dilution with water, where of course we do not reckon the water added, 20,000 lbs. of urine yield from 13 to 1400 lbs. per German acre of manuring matter, and when applied quite fresh there is an amount of no less than from 14 to 1600 lbs. Hence it will be obvious to every one, that the urine tanks are no such excellent arrangements as they are frequently represented to be, and that it is in many cases more profitable to pour the urine over the dung in the dung-pit, or to supply so much straw that the whole of the urine may be absorbed, for then the humic acid arising from the solid excrements will be combined with the ammonia formed at the same time from the urea, &c. There is this additional advantage, that the urine, as the most efficient portion of animal excrement, being mixed with the dung, may be distributed more equably over the ground, that no manure barrels, &c. are required, and that there is no necessity to bestow labour on the preparation of the urine; for the urine, if any, which is not taken up by the dung, may always be most profitably employed in the preparation of compost. In some parts of Central Germany they pour the urine, time

* The Prussian acre (since 1816) is nearly equal to the Brunswick acre, and, therefore, about $\frac{5}{8}$ of the English acre.

after time, into conical heaps of common earth, hollowed to a proper depth in the middle; and when these have stood the proper length of time, and been thoroughly worked for use, they are led to the field. This process is very advantageous where good mould, or earth rich in humus, are not to be had, but must be conducted with the requisite caution: we must, for instance, not pour into the heaps so much urine that the liquid penetrates through them and escapes, for even when perfectly clear and colourless, it always still contains carbonate of ammonia and other ammoniacal salts in solution, humate of ammonia being the only one of them which colours the urine brown.

When urine is applied as a manure to growing crops, we have to take particular care that no solid excrements occurring accidentally in the urine-tank be conveyed to the urine-cask, as they easily occasion on the leaves of plants an incrustation, which injures their growth; with this further evil, that the plants are thus rendered loathsome to the cattle: and still more has this to be guarded against in the employment of the *gülle,* about to be described.

The manuring property of urine may also be increased in an extraordinary degree, when we add to it mineral substances, such as gypsum, common salt, bone-dust, potashes, wood-ashes, soda, saltpetre, green copperas, alum, &c.

Lastly, one of the uses of manuring with urine, which has hitherto been little regarded, consists in this, that earth-worms and the larvæ, or grubs, of various insects, which in many countries, for instance, on the Upper Weser, do such extraordinary injury to the young rye, are destroyed by it: this effect is produced, as my own experiments, made expressly on this point, have shown, by the ammonia of the urine; for if we water a field much infested with earth-worms with a solution of carbonate or caustic ammonia, the worms come immediately to the surface, writhe for some time, and then die. Probably, also, the cock-chafer grub, when not too deep in the ground, might be destroyed in the same manner; a fact that would be of great importance to many districts.

GÜLLE.

In some districts of Switzerland, chiefly on the Lake of Zürich, as well as in South-west Germany and Holland, they have for a long time been in the habit of mixing the fluid and solid excrements of cattle with a large quantity of water in trenches and tanks prepared especially for their reception, and leaving the compound, before applying it for the purpose of manuring fields and meadows to putrefy for a length of time, giving it then the name of *gülle.* In Switzerland they have a mode (about to be de-

scribed) of adapting the stalls in which the cattle are kept to the particular purpose of preparing the gülle: in the south-west of Germany (in the Black Forest), on the contrary, they construct the tanks for the gülle in the fields, convey the fluid and solid excrements into them, and mix them in the tanks with water, which they conduct from neighbouring springs, and thus save much trouble in the conveyance of the water.

In Switzerland, where the preparation of gülle has been longest in use, the cattle stand on a floor covered with planks, bricks, or tiles, and having a slight inclination towards their heels, where a horizontal trench for receiving the excrements runs from end to end. This trench is formed of boards or walling, 1½ feet wide and 2 feet deep, emptying its contents into a tank lined with boarding, 6 or 8 feet deep, and of the same length and breadth, situated either in the cow-house itself,* or close to it, and covered with a lid. The horizontal trench being in the first instance half filled with water, the urine runs into it of itself, and the animals drop a part of their solid excrements into this trench, the space allowed for them to stand on being so short that their hind quarters are close upon the edges of it; so much of it as does not fall into the trench being several times a day raked in, and the surface well washed with water. The straw litter, which has become foul with excrement, is twice a week removed from under the animal, thrown into the trench, and having been there well stirred backwards and forwards with the dung-rake, is taken out. After it has been in this manner freed from the solid excrement attached to it, and thoroughly washed, it is laid at the edge of the trench in small heaps, in order in the first instance to drain out the superfluous liquid: it is then carried out of the building, and formed into regular four-cornered heaps, becoming in a short time so wholly decomposed as to be converted into a dark-brown fatty manure, which possesses, however, as may be seen in Switzerland, no particular efficacy, deprived, as it has been, of the best portions of the excrement. After the first washing of the litter the trench is two-thirds filled with water, and again in the course of three or four days the fresh straw, rendered foul with excrement, is washed and put aside as before The trench being at length quite full of liquid, it is well stirred up, the sluice-gate raised, and the whole contents of the trench allowed to flow into the tank. Then the trench, as at first, is again half filled with water, and the litter, as before, washed in it, until it is quite filled with liquid, when the sluice-gate is in like manner raised and the whole passed into the

* The placing of the tank within the building deserves the preference, on account of its even temperature being more favourable to the putrefaction of the gülle.

tank: in short, we continue these washings as long as the size of the tank will allow. In large establishments they now convey or pump the already fermenting gülle out of the tank into a greater reservoir, situated either within the building or outside of it; and before leading it to the field, they allow it to remain in this reservoir until the fermentation is over, which generally takes place, according to the temperature of the air, in from four to six weeks. When the gülle thus prepared is applied as a top dressing, we must take care, that in pumping it into the barrel in which it is carried into the field, no agitation takes place, otherwise the undecomposed particles, consisting of vegetable fibre, will lie upon the leaves of the young plants and produce an injurious incrustation. In summer it should be applied only in wet weather, otherwise the plants, when the soil is dry, will receive too concentrated a nutriment, and consequently become rather worse than better. We might, indeed, obviate the evil by a greater dilution of the gülle with water, but the labour of carting it out on the field would then be too much increased. On account of the labour of carriage, the gülle, generally speaking, can only be applied to fields and meadows which lie near the homestead, unless you proceed with it, as they do in the Black Forest round Donaueschingen, where the gülle-pits are made in the fields and meadows, or close to them. The most indispensable requisite in the preparation of the gülle, as we may easily suppose, is a sufficient quantity of water, and that water is naturally the best adapted for the purpose which holds a large quantity of saline matters in solution, for then the soil obtains additional substances which afford nourishment to plants.

In the Black Forest they always add some green copperas (sulphate of iron) to the putrefying gülle in their tanks, experience having proved that this substance very much strengthens its manuring properties. Of this effect, indeed, we cannot have a doubt, since by its means a portion of the ammonia developed by the urine becomes chemically combined with the sulphuric acid of the copperas, and the resulting sulphate of ammonia, as we know, is one of the strongest saline manures.

Now, although the arrangements of the cattle-stalls, as well as the numerous tanks, required in the preparation of the gülle, in order to preserve it for the proper period, occasion much expense, and likewise its distribution over the field much labour, these outlays are richly repaid in the advantages derived from this manure, as will be more clearly shown under the following heads:—

1. The water, which is constantly kept in the trench, absorbs much of the carbonic acid given out by the cow in the act of breathing, and consequently the ammonia arising from the urine is not only neutralised and thus rendered less volatile, but the carbonic acid is also in itself a strong manuring substance.

2. The water in the trench serves to keep the cow-house cool during the heat of summer, and the vapour occasions a dampness in the atmosphere, which is much better for the health of the cow than a hot and dry air.

3. Little, or perhaps none, of the ammonia, developed by the urine, is lost; its escape being prevented, as my own experiments on the putrefaction of urine and water have proved, by the large quantity of water present. The absolute gain of manuring element from this circumstance is, indeed, very considerable, and fully confirms the statement of the Swiss, that since the time of the introduction of gülle agriculture has been considerably improved.

4. By means of the gülle, a sickly plant derives almost immediate relief, in consequence of all the nutriment being already dissolved by the water, and in a fit state to enter at once into the plant.

5. It is a point of particular importance that, in adopting the use of gülle, a quicker return on outlay of capital is obtained than in the case of common yard-manure.

6. From the gülle little or none of the manuring matter is carried off by the rain, while from yard-manure it frequently happens that much is so lost; the practice of spreading it on the field in heavy dressings causing its action to continue during three or four years, or even longer.

7. By means of the gülle plants may be brought with most certainty to the exact degree of luxuriancy which will yield the most abundant produce.

8. The growth of forage-plants, particularly of clover and the meadow-grasses, is greatly secured by the application of gülle, particularly when (as they do in the Black Forest) we add green copperas to the putrefying gülle, and the stall-feeding of cattle in summer is made more practicable.

9. Lastly. In adopting the preparation of gülle less litter will be required. When cattle are not properly bedded, much of the manure escapes in the form of gas, while by mixing the excrement with a large quantity of water, little or none of it is lost: it is consequently evident, that in the preparation of gülle a greater quantity of manure is gained than in that of common yard-dung; and, what is the most important point is, that the gülle has retained a larger proportion of that very substance which has the most important influence in the nourishment of plants, namely, ammonia. In fact, all the advantages derived from the preparation of gülle are so important, that we cannot but wish comparative experiments may be made, in order to ascertain with more certainty what is the real amount of gain in its adoption. It might, perhaps, be useful also to prepare gülle from horse and sheep-dung, as under the present management of these manures

far more ammonia is lost by evaporation than in the case of cattle-dung.

The gülle is conveyed to the field in a barrel, placed on a waggon having iron axle-trees, since wooden ones are soon decayed from being constantly splashed with the liquid. The wheels should have broad felloes, in order not to cut deep when drawn with the gülle over green crops, pastures, or meadows. The flow of the gülle from the barrel is best effected by a hole made underneath it in its centre. Under the hole hangs a board, on which the liquor splashes, and so distributes itself in every direction in the best manner possible.

AHL.

(Dunghill-drainings, dung-water, dung-puddle, puddle.)

When much fluid excrement (urine) is mixed with dung, and much rain falls, there is formed in manure-pits, capable of holding water, a liquid consisting partly of urine and rain-water, and partly of many dissolved particles of solid excrements, the character of such solution depending upon the character of their component parts ; humic acid is however always present, and the liquid has consequently a brown, and sometimes black colour, being termed " ahl," " pfuhl," &c., in different districts. Now the dung cannot pass into decomposition if it be filled with water, and therefore, in wet weather, it will be necessary to lay a drain in the manure-pit, for the purpose of pumping away the superfluous liquor, and employing this as a manure in its separate state. But before it can be applied to meadows and crops it must have undergone putrefaction; as it contains, like urine, much caustic ammonia at the beginning of decomposition, and in that state would therefore, as already mentioned, easily destroy vegetation. When very concentrated, we shall always do well to allow it to putrefy with an addition of water, as we shall by this means obtain all the advantages which have already been mentioned as being derived from urine when treated in a similar manner. On the contrary, if we leave the concentrated ahl, as is usually directed, to putrefy so long that the smell of the ammonia is gone, we have lost by so doing a great amount of the choicest part of the manure. In fact, we cannot do a more unprofitable thing than to comply with such a direction; which those only will know how to estimate who have seen, by direct experiment, in how extraordinary a manner the salts of ammonia promote vegetation.

The " pfuhl," or puddle, might be much improved, when we wish it, by the addition of poultry-dung, or even of night-soil; but, in that case, we must lose no time in diluting the mixture

with water, in order that we may lose as little as possible of the ammonia, which then becomes developed in greater quantities. The loss will be the smallest when we cast it as fresh as possible upon recently-ploughed land, and harrow in; or when we mix it with earth which abounds with humus—that is, employ it in the preparation of compost.

When the puddle has undergone decomposition, and no longer contains caustic ammonia, it is in a proper state, like the putrefied urine, to be led on the field and applied to growing plants, but only in moist weather, for impregnated as it is with so many substances, which it holds in solution, the plants may easily be supplied with too much nourishment, and in that case would sicken or die, should the ground itself not already contain a sufficient degree of moisture to dilute the strength of the manure. We may assume in general that neither puddle nor urine should hold more than 4 or 5 pounds per cent. of solid matter in solution, to be applied with safety to growing crops in dry weather. When there is much rain, and the manure-pit becomes flooded (which it ought never to be) with the rain-water from the adjoining roofs, the ahl will often scarcely contain 2 per cent. of manuring matter, and is then naturally of but little use.

The puddle, like putrefied urine, acts for one year only, having all the advantages attending the application of gülle and other liquid manures; provided, however, it be not too much diluted. The same caution is also to be observed in its management; and in its application the greatest care should be paid to its equal distribution over the surface of the field. The proper quantity to be applied over a given surface, in order to produce a proper effect, must be regulated by the amount of matter it holds in solution: this, in the case of urine, may be determined with tolerable exactness; but as the quality of the puddle, on the contrary, is dependent on accidental circumstances, no given rule can be laid down on this point.

The solid and fluid excrements of cattle serve also as manure without being previously fermented and putrefied, or mixed with litter; namely, when cattle feed at large from one to four years, in fields sown with clover, or other grasses, such pastures being afterwards broken up and sown with corn. There is always the loss of a great part of the manure in this case, for much of it evaporates, and a further quantity is devoured by worms and insects. On the other hand, little or none of the excrement is wasted, when we fold off, and immediately plough in, and there is no doubt that the folding of proper soils with cattle is a practice which deserves imitation.

II.—ON THE EXCREMENTS OF SHEEP.

(1.) *Solid Excrements.*—Sheep abstract somewhat more nourishment from their food than neat cattle; for, if we first weigh the dry food given them, and afterwards the dry excrements, we shall find that these weigh rather less in proportion with sheep than with cattle. It may, indeed, be supposed that in the digestion of sheep, a greater amount of oxygen and hydrogen unite to form water, which accordingly evaporates on drying. Still the stomach and other digestive organs of sheep must have the power of abstracting from the food a larger quantity of nourishment than those of cattle, as sheep in eating chew their food more minutely; this is the reason why the same food, especially when consisting of hay, straw, or other dried plants, goes further with sheep than with neat cattle; and it is by no means an unimportant circumstance. The digestive organs of sheep would seem, even in some degree, to reduce vegetable fibre, a substance which passes undigested through the bodies of most other animals, not excepting the human body. Of what incalculably important consequence would it be if food could be so prepared, in some cheap manner, as to render the whole of the vegetable fibre digestible! That the fibre is capable, by chemical means, of being brought into such a state, we know by the fact, that sugar may be obtained out of paper, which is very pure vegetable fibre. It is matter of experience, that green clover is better food than the hay made from it; the simple reason of which is this, that, in the process of drying, many of its vegetable particles are so much hardened that the digestive organs have no longer any power to reduce them. By steaming the hay the hardened particles are again softened, and consequently there is always a less portion of such food required than of the dry.

According to Block, there result from 100 pounds of rye-straw given as fodder to sheep, 40 pounds of excrements (fluid and solid); from 100 pounds of hay, 42 pounds; from 100 pounds of potatoes, 13 pounds; from 100 pounds of green clover, 8½ pounds; and from 100 pounds of oats, 49 pounds of dry excrement. In this case, therefore, the same thing happens as with cattle, upwards of one half of the solid food being lost, whether from straw or any other kind of food (for 100 pounds of green clover give 20 pounds of hay, and 100 pounds of potatoes leave 24 or 25 pounds of solid substance), partly in the formation of water, partly in the carbonic acid of respiration, partly in the production of wool and the formation of flesh and fat, and partly also in the last place, in the evolution of ammonia through the skin.

The solid excrements of the sheep have been chemically investigated by Zierl; and this, as far as I know, is the only chemical

investigation we possess on the subject. 1000 parts by weight of the solid excrements of sheep fed on hay contained—

Water	679
Sugar of gall and soluble salts (?)	34
Bilious, with extractive matter (?)	19
Humus, with coagulated albumen and mucus of the intestines	128
Woody fibre and vegetable remains	140
	1000

1000 parts by weight of the dry excrement gave, on being burnt, 96 parts of ashes, consisting of—

Carbonate, sulphate, and muriate of soda	16
Carbonate and phosphate of lime	20
Silica	60
	96

He has undoubtedly overlooked magnesia, potash, alumina, oxide of iron, and oxide of manganese, as all these substances occur in the hay which the sheep had eaten; but we may take for granted that the whole of the potash of the plants would pass off in the urine.

The chemical component parts of the solid excrements of sheep, as well as of all other excrements of animals, depend naturally on the food the animals eat; and they are so much the better or worse, as the food itself is stronger or poorer.

Solid sheep-dung contains, as is apparent from the chemical analysis, somewhat less water than the solid excrement of cattle—a circumstance which, the appearance alone of the sheep-dung, being less soft and pulpy, would have led us to expect: they possess, on the other hand, more of the easily-decomposable substances containing nitrogen; for while the solid excrement of cattle, in 1000 parts by weight, contain only from 105 to 112 of this and other substances that are quickly decomposed, that of the sheep contains no less than 180 such parts; and if we consider that sheep-dung consists of finely-divided parts, we shall easily understand how it happens that it comes sooner into action than that of cattle, and whence it arises that on their further putrefaction (when lying in heaps) they generate so much heat.

The excrements of the cow, when fed on green spurry, contain, according to the same chemist, 15 or 16 per cent. of vegetable fibre, while the excrements of sheep fed on hay contain only 14 per cent. of that substance: now, as the amount of water in cattle-dung is about 4 per cent. greater than in that of sheep, and since the proportion therefore of vegetable fibre ought to be the largest

in sheep-dung, we may draw the conclusion, as before, that the sheep digests a portion of the vegetable fibre itself.

From the pulpy nature of cattle dung, and the firmer character of sheep-dung, we might indeed conclude that the difference in the proportion of water they each contained would be greater than 4 or 6 per cent.; but the vegetable fibre being in a finer state in sheep than in cattle dung, it is capable of retaining more water within its interstices without such additional water being obvious. Now, although the excrements of the sheep undergo a quicker decomposition than those of cattle, this does not take place in the ordinary mode in which the sheep manure is obtained, there being a deficiency in the moisture requisite, and the dung so firmly trodden down by the sheep, which is not tied up like the ox, that oxygen, which is essential in every case of quick decomposition, can gain no entrance: accordingly, in sheep-manure, which has lain perhaps a year or more in the sheep-house, we always still find solid excrements in which scarcely any change is perceptible.

All the products which arise from the putrefaction of the solid excrements of cattle appear also on the putrefaction of sheep-dung; the latter, however, also yields much ammonia; hence it is obvious that sheep-dung must contain more substances with nitrogen for an element than cow-dung does; and this is exactly the reason why sheep-dung so quickly passes into decomposition. In cattle the substances containing nitrogen, which are secreted from the body of the animal, occur more in the urine; but we might almost imagine that, with the same food the fluid and solid excrements of the sheep, taken together, would possess more substances containing nitrogen than are contained in the whole of the excrements of cattle, since the former develop, as it appears, a rather larger quantity of ammonia than the latter. Whether or not they do really contain more substances united with nitrogen is a point that can only be decided by a special chemical analysis, on a rather large scale, of the food and of the excrements of both these kinds of stock; but it would be in the highest degree interesting to have light thrown upon this part of the subject, more especially as we should then have the dispute respecting the different value at which cattle and sheep manure ought to be estimated finally set at rest. It has been recently maintained by physiologists that animals do not breathe out quite as much nitrogen as they inhale: if now the sheep surpassed the ox in the amount of nitrogen thus retained, its excrements would also have the preference over those of cattle, for the nitrogen must associate itself in a concentrated form with the excrements.

From the great quantity of ammonia which sheep-dung developes may be explained its remarkable effect on every kind of

soil containing a very large proportion of humic acid or carbonised humus, since it thus partly neutralises the humic acid by the ammonia it gives out, and partly brings the carbonised humus by the same volatile alkali to speedy decomposition, or otherwise converts this useless substance into food for plants. The ammonia, however, is also the cause of the crops, especially of the cereal ones, being very liable to grow too luxuriantly after the application of sheep-manure, of the grain being very abundant in gluten, and of its not being suitable on that account for seed, the manufacture of starch, or even the distillation of brandy, although it is at the same time very nourishing.

On soils which contain little humus, sheep-excrements, on the contrary, very easily injure the crops, from the ammonia which they develop burning them up, as we know by experience. Of this last fact we may easily convince ourselves by watering plants with a concentrated solution of ammonia, even of the carbonate, as they become black, and appear as if charred; no heat, however, being produced, which could have occasioned such an effect.

(2.) *Fluid Excrements.*—As sheep drink very little water, they accordingly void only a very inconsiderable portion of urine; but even when they take no drink whatever, the water of the urine and that found in the solid excrements is greater in amount than what existed originally in the food taken by the animals; and hence it follows, that as sheep likewise breathe out water in the form of vapour from the lungs, and evaporate it through the skin, they must produce water chemically from oxygen and hydrogen during the process of digestion.

The urine of the sheep, on account of its small amount, is therefore never collected and used by itself, but is always taken up by the litter, and applied to the land along with the solid excrements; accordingly, although not belonging to circumstances to which much attention is devoted in agriculture, it is nevertheless interesting to learn the component parts of this urine: with this view, I have several times submitted it to a superficial chemical analysis, and I have found that it is more abundant in salts than the urine of the cow, without, however, containing so many substances possessing nitrogen: 100,000 parts by weight of the fresh urine of sheep kept at grass, and which, when tested, was found to indicate neither acid nor alkaline properties, contained—

	Parts by weight.
Water	96,000
Urea, along with some albumen and colouring matter	2,800
Salts of potash, soda, lime, and magnesia, with traces of silica, alumina, iron, and manganese	1,200
	100,000

Sheep urine contains, therefore, as we perceive, 4 per cent. more water than cattle urine; but possessing a tolerable quantity of urea, it passes quickly into decomposition, and developes, in consequence, much ammonia—a fact which explains the occurrence of the strong ammoniacal smell in the places where sheep are kept; this smell being much increased, however, by the ammonia likewise produced in the decomposition of the solid excrements which contain much nitrogen, and by the exhalation of a certain degree of ammonia through the skin of the sheep. The ammonia thus formed naturally evaporates the sooner when the manure is deficient in moisture, which would retain it. Hence it is obvious how great a quantity of the ammonia of this incomparable manure is lost in the ordinary management of the dung when sheep are kept in houses, and how anxious we should be to introduce some better plan for obtaining it.

FOLDING.

It is a well-known practice in many countries, from spring til late in the autumn, to fold the sheep on the field at night in a given space of ground enclosed with hurdles, in order that, by means of the fluid and solid excrements of the animals, the ground may be conveniently manured.

Although many persons are of opinion that fold-dunging is attended with a loss of manuring matter, for the reason that the sun and air abstract much of the goodness of the excrements, it is not the case; on the contrary, there is, as we shall show, a greater gain of manure than when the sheep-dung is amassed in the shed. Fold-manuring, indeed, possesses many advantages, of which the following are the principal:—1. The conveyance of the manure is saved; a circumstance of no inconsiderable account where the fields lie at a distance and the roads are bad. 2. By fold-manuring, we can render immediate aid to a weak and sickly crop, and even spring-barley already several inches high is brought by its means to a luxuriant growth. 3. Winter corn, also, where the soil is not wet and clayey, may be fold-manured even when considerably grown, and thus there is no necessity for allowing the seed-time to pass away while dung is being carted out. 4. By means of fold-manuring, loose, sandy, and moorland soils are not only dunged, but become more firm and compressed by the treading and lying of the sheep. 5. Field-mice are driven away, and the slugs are destroyed. 6. The crops which are grown after fold-manuring are clearer of weeds than those after ordinary manure, which brings many seeds of weeds upon the land. 7. The sheep, in hot weather, are always more healthy from being in the hurdles at night than in the

houses; but in cold and rainy weather, it will be more advisable, especially in the case of fine woolled sheep (Merinoes), to take them up at night; and least of all should Merinoes be hurdled in wet weather where the soil is coloured red from the large quantity of iron it contains; for in that case the wool will acquire a very bad condition, and be capable of being washed clean with difficulty, if at all. Sheep which have been shed-fed in summer, are, on the other hand, washed clean with far greater ease, when hurdled for fourteen days before shearing. 8. By the treading of the sheep, both in and out of the shed, much of the excrement is wasted, whilst little or none of it is lost when it comes immediately on the pasture within the hurdles. 9. In fold-manuring we save much straw, which may be either reserved for the winter, or will serve as litter or fodder for cows fed in the stall. 10. Lastly, The most important advantage of hurdling consists in this, —that a greater quantity of manuring matter is obtained; for, on the one hand, the best portion of the excrements are not wasted by evaporation, which is always the case when they are collected together in the stall; and, on the other, the perspired vapours of the sheep, consisting of carbonic acid and ammonia, are absorbed by the soil if it has been previously ploughed and loosened. In consequence of the excrements not lying together in large heaps, they do not undergo, so quick a decomposition as in the stall; and while much ammonia is uselessly evaporated in the shed, none at all is lost in fold-manuring, for as soon as a little ammonia is produced, it is immediately absorbed by the soil, and chemically combined with the humic acid it contains.

In order to obtain the greatest advantage from fold-manuring, it is necessary that the soil, if it be hard or stiff, should be previously loosened, for it is then enabled both to absorb, as just remarked, the perspired gases of the sheep with greater facility, and also to allow the fluid excrements, which are the first to undergo decomposition, a free passage into its pores. It is likewise of great advantage to plough in the manure as soon as the sheep are removed, in order to prevent its evaporation: it must be ploughed shallow, however; otherwise, when the manure is deep in the soil, the rain which follows will carry the manuring matter beyond the reach of the roots; harrowing-in will, on light soils, be sufficient. It is also essential that a good distribution of the fold-manure over the field should be effected; and in order to accomplish this, the sheep should be brought into a moderate space, as they are generally in the habit of herding thickly together, and of lying in one or other particular corner of the enclosure, and manuring such parts of the fold disproportionally with the rest: hence, when the space enclosed is too large, many parts of the field obtain no manure whatever: on

the other hand, the enclosure ought not to be too small, as it would then be injurious to the sheep from the inconvenience it would occasion them in lying down. The best fold is one of an oblong form, which allows 9 or 10 square feet to each sheep. When the sheep have a rich pasture by day, and remain 9 or 10 hours in the fold at night, 2400 head of them will be required to well manure a Magdeburg acre (two-thirds of an English acre): on the contrary, when we wish to give a piece of ground only half a manuring, the fold is moved once, or even twice during the night. On light soils, where every kind of manure comes more speedily into operation than in the case of heavy land, if we would avoid the risk of laying the crops, we must not put more than 2800 head of sheep on the Magdeburg acre. The effect of fold-manuring lasts only one year.

In farms where much of the land is under naked fallow, a good opportunity is always afforded for the application of fold manure; but where there is no naked fallow, we fold for barley both before and after sowing; for rye and wheat, after the peas, vetches, beans, &c., have been cleared off; for potatoes, before and after planting; for cabbages and turnips; and on clover fields, after the first or second cutting, &c. The best appliaction, however, of fold manure is made in those cases in which the produce we wish to obtain is not very likely to grow too rankly, as rape, hemp, tobacco, cabbage, and others of the same kind. When it is applied to corn the grain is apt to be thick-skinned, and consequently there is an increased proportion of straw, as is always the case after every kind of dung which comes quickly into action. It generally acts as speedily, but by no means so permanently, as the common sheep dung, and we have therefore to be very careful not to enclose too many sheep within a given space, if we wish to avoid the risk of laying our crops.

The plan of manuring within hurdles presents a phenomenon which appears to stand in opposition to the views already developed on the action of animal excrements: it is not clear why the urine in its perfectly fresh state inflicts no injury on the growing plants, while the fresh urine of cattle is so immediately injurious to them. We apply folding, as previously observed, not only with a very good effect to barley already out of the ground, but, provided the ground is not wet and clayey (for then the sheep would tread it too firmly), it may be applied with great use to young rye, once-mowed clover, &c. The reason of this is, that the ground, even with the strongest fold-manuring, receives only a very small quantity of manure: the Magdeburg acre obtains, indeed, about 4000 pounds; but if we take into account the water of the urine and of the solid excrements, as well as the vegetable fibre (which only comes into operation after some time),

there are contained in these 4000 pounds only 620 pounds of real manuring matter; and even these 620 pounds do not come at once into operation, for that takes place only with the easily-soluble salts of the urine and some substances of the solid excrements, which, when dissolved in water, are capable of being immediately taken up by the plants; and these soluble substances taken together may probably amount to 200 pounds. This sufficiently explains the reason why growing plants suffer no injury from the fresh manure in folding, for they are able to digest sufficiently the small quantity which they absorb. Besides the soil in general contains as much humic acid as is requisite to neutralise at once the ammonia developed from the droppings; for if we assume that 100 pounds of ammonia are produced by the 620 pounds of droppings, only 900 pounds of humic acid would be required to saturate that quantity of ammonia, and it may be taken for granted that so much at least exists in the soil, as the German acre of land, even if possessing, to a depth of 6 inches, only ¼ per cent. of humic acid, would still, on that supposition, afford 3000 pounds. The ammonia, too, which is gradually developed, in case it should not meet immediately with a sufficient quantity of humic acid to neutralise it, would combine with the carbonic acid present in the soil, and thus lose, if not wholly, at least in a great measure, its injurious properties.

It has been a practice of late years to sprinkle the droppings of the fold with gypsum powder before ploughing in, and as it is said with good effect. It is possible that the gypsum undergoes decomposition by the carbonate of ammonia produced from the droppings, carbonate of lime and sulphate of ammonia being formed; and as the latter salt is more soluble in water than sulphate of lime (gypsum), it must of course come sooner into action. Gypsum, which is sulphate of lime, requires 450 times its weight of water to dissolve it, while sulphate of ammonia is soluble in four or five times its weight. If this explanation, therefore, be correct, the operation cannot fail to be of use, especially in very dry seasons, when gypsum alone will not act.

EXCREMENTS OF THE HORSE.

(1.) *Solid Excrements.*—As horses are generally fed with corn, it is natural to suppose that their solid excrements should contain many substances having nitrogen as an element; and this circumstance explains their rapid decomposition. This, and the smaller amount of water contained in them than in the excrements of cattle, is the combined cause of so considerable a heat being developed, and of the ammonia's escaping in so much greater quantity in the form of gas.

According to Block, 100 pounds of chopped rye-straw, given as fodder to horses, yield 42 pounds; 100 pounds of hay, 45 pounds; 100 pounds of oats, 51 pounds; and 100 pounds of rye, 53 pounds, of dried excrements (fluid and solid): whence we must draw the conclusion that water is chemically formed in the stomach of the horse from the oxygen and hydrogen of the food; for although a great part of the carbon of the food passes off by respiration from the lungs in gaseous combination, that quantity can scarcely be so large as to account for the loss sustained, namely, from 47 to 58 pounds. The solid excrements of the horse have already been many times subjected to chemical investigation. According to Gazzeri, 1000 parts by weight consist of—

Water	708
A soft substance (?)	113
A substance soluble in water (?)	26
Vegetable fibre	153
	1000

According to a more accurate analysis by Zierl, 1000 parts by weight of the solid excrements of horses fed on hay, oats, and straw, contain—

Water	698
Picromel and soluble salts (?)	20
Bilious and extractive matter (?)	17
Green humous matter with coagulated albumen and intestinal mucus	63
Vegetable fibre and remains of food	202
	1000

1000 parts by weight of the dried solid excrements gave, on burning, according to Zierl, 60 parts by weight of ashes, of the following composition—

Carbonate, sulphate, and muriate of soda	5
Carbonate and phosphate of lime	9
Silica	46
	60

We may assume with certainty that alumina, magnesia, manganese, and iron, have been overlooked, as these bodies are always present in the food.

When horse-dung lies in large heaps, it undergoes, as already remarked, a very quick decomposition, becomes heated, steams, and developes much ammonia, carbonic acid, carburetted hydrogen, and, when the heat increases, also carbonic oxide, finally passing into a half-carbonised state, and becoming mouldy; in conse-

quence of which a great loss of manuring matter takes place. Professor Gazzeri, from experiments made expressly on this point, ascertained that 9½ per cent. of the solid mass is lost in the course of two months; whence it is evident how injudiciously we act when we allow horse-manure to lie for a long time in heaps at the stable door. The late illustrious English chemist, Sir Humphry Davy, maintained, indeed, in his 'Agricultural Chemistry,' that the excrements would lose none of their manuring matter in the form of gas until heated up to 100° Fahr.; but this assertion is nevertheless quite unfounded, for both the ammonia and carbonic acid escape in the gaseous state long before the mass has attained the degree of heat in question, as is also the case in putrefying urine.

The solid excrements of horses are as difficult to mix with the litter as those of sheep, and it will, therefore, be found best to throw them into the manure-pit with the cattle-dung.

If we manure a field with fresh horse-dung, and sow it immediately afterwards with corn, it frequently happens that the plants turn black and appear charred: this always arises from that portion of the ammonia, produced from the dung, which has not been neutralised by humic acid. This blackening of plants is erroneously regarded as the effect of smut; it is most likely to happen when a soil very deficient in humus has been manured with horse-dung. In order, therefore, that none of the ammonia may be lost in the form of gas, it will always be found the most advisable to apply fresh horse-manure where the soil is richest in humus; for so the manure has an useful effect on the component parts of the soil in rendering the humic acid more soluble.

Horse-dung has the same effect as that of sheep when applied to cereal crops, producing an undue proportion of straw and thick-skinned glutinous grain.

(2.) *Fluid Excrements.*—Horses drink less water than cattle; and as they lose at the same time much moisture by evaporation through the skin, they consequently discharge much less urine than cattle.

According to Fourcroy and Vauquelin, the urine of the horse is composed as follows:—

Water	94.0
Urea	0.7
Benzoate of soda (hippurate, according to Liebig)	2.4
Carbonate of soda	0.9
Carbonate of lime	1.1
Muriate of potash	0.9
	100.0

This analysis, however, as can be easily proved, is not quite correct: it ought to comprise small proportions of mucus, albumen, magnesian salts, phosphate of lime, colouring matter, and some other less important substances.

Since horse urine contains, as we perceive, much less matter having nitrogen in its composition (urea) than cattle urine does, it has much less value as a manure: on account of its small amount it is, besides, never worth the trouble of being collected and employed by itself, but is brought to the soil in mixture with the solid excrement and litter. The circumstance of the urine of the horse containing so few substances united with nitrogen explains to us how it happens that in the solid excrements there are found so many of these bodies. The nitrogen derived by the body from the food, is again, however, partly lost by evaporation through the skin, combined with hydrogen, and forming ammonia; the perspiration of the horse always having, from this cause, an ammoniacal odour.

EXCREMENTS OF PIGS.

(1.) *Solid Excrements.*—Although the solid excrements of the pig have not yet been chemically investigated, we may conclude from their external appearance that they contain more water than the excrement of the horse and sheep; and we may probably assume that they contain, like the excrements of cattle, at least 75 per cent. of water. Pigs are, of all animals, the most indiscriminate in their diet, and their excrement must on that account vary much, according to the kind of food they may happen in any particular case to obtain: their digestive organs are, however, very powerful, and we may therefore suppose that they abstract more nourishing (and consequently more manuring) matter from their food, than other animals. Pig-dung is certainly, and very justly, the least regarded of all manures by the farmer, and becomes superior only when the animals are very highly fed, which only happens in the case of fatting pigs. Containing so much water and so little nitrogen, they are, of all animal excrements, the slowest to undergo decomposition. They develop, on their putrefaction, very little, if any heat; and yield as little ammonia. Pig manure is, therefore, regarded by the farmer as one of the "cold" manures.

The solid, as well as the fluid excrements of the pig must contain some substance which is very difficult of decomposition, and which is also soluble in water; for most esculent roots, when manured with pig-dung, acquire a very disagreeable flavour; and tobacco so grown is intolerable to the smell. They are best adapted for hemp; and, some say, also for the hop-plant.

Pig-dung is generally mixed with cow-dung before being used as a manure.

(2.) *Fluid Excrements.*—Of all animals pigs, in consequence of the large amount of liquid food they obtain, discharge the greatest quantity of urine; which acquires in putrefaction the most intolerable odour, occasioned by a peculiar volatile substance, at present imperfectly known; and it is this substance probably which communicates the unpleasant flavour to esculent roots. According to my own investigation, 100,000 parts by weight of the urine of pigs fed on corn offal, consisted of—

Water	92,600
Urea, with a very little mucus, albumen, and colouring matter	5,640
Salts; as common salt, muriate of potash, gypsum, carbonate of lime, and sulphate of soda .	1,760
	100,000

It results from this analysis, that the urine of the pig contains rather a smaller proportion of water than the urine of cattle, and $1\frac{1}{2}$ per cent. more of urea; and this circumstance perfectly explains the reason of its being more caustic in its fresh state than that of cattle, a larger supply of ammonia being created out of the greater amount of urea present. Accordingly, before we can apply the urine of the pig to growing plants, it must necessarily have undergone putrefaction. To prevent, however, an useless escape of the ammonia, it will be very advisable to dilute it with a good deal of water before exposing it to putrefy, or to proceed with it as already recommended in the case of cattle urine. The ill effects of pig urine, not properly putrefied, are commonly ascribed to the presence of a peculiar acidity, but they arise from no other cause than the caustic ammonia.

If this urine is conducted, as is generally the case, into the manure pit, a great loss of manuring matter, in the form of gas, always takes place; and it is, therefore, the best plan to convey the urine by itself into a tank, and mix it with a large quantity of water: for this plan, however, a judicious arrangement of the sty is necessary, and, if situated near the cattle stalls, the urine of the pig can be led to that of the cattle, and here, under the directions already given, be allowed to putrefy. It is maintained that when the urine of the pig gets into a pond containing fish it kills them: should this actually be the case, the effect would probably be occasioned by sulphuretted hydrogen, resulting from the decomposition of gypsum, a gaseous poison, to the action of which fishes are very sensible, and of which a very small quantity is required to kill them instantly.

EXCREMENTS OF POULTRY.

Poultry discharge their excrements only through a single opening, and consequently the fluid and solid portions are mixed together.

Poultry dung is one of the most powerful manures, and is therefore worthy of greater consideration than is generally bestowed upon its collection, especially as it so soon decomposes, and consequently loses so much ammonia; and it would lose a still greater quantity of that gas did the excrements not dry quickly, and thus prevent a further decomposition of their urea. The strongest are those of pigeons and domestic fowls—a fact easily explained, by the circumstance of their living chiefly upon grain, insects, and worms, while geese eat grass also. That we may lose none of the ammonia developed during the putrefaction of poultry-dung, we should do well to strew the yard and house in which they are kept with soil abundant in humus, for then the ammonia of the manure will be combined with the humic acid of the earth. The strewing of the ground with sand, saw-dust, &c., as commonly practised, is in this point of view of no use whatever.

The excrements of pigeons have been chemically examined by Sir Humphry Davy and myself. Davy found in 100 parts by weight, 23 parts of substances soluble in water, consisting of urea, urate of ammonia, common salt, and some others. According to my own experiments, pigeon-dung half a year old contained only 16 per cent. of bodies soluble in water, consisting of very little urea, but of a large proportion of carbonate, sulphate, and humate of ammonia, common salt, and sulphate of potash. The other 84 parts insoluble in water consisted of coarse siliceous sand, silica, phosphates of lime and magnesia, traces of alumina, and oxides of manganese and iron. The abundance of soluble substances explains the quick effect of pigeon-dung, and also shows us once more the great value of mineral manure.

When the droppings of geese come in contact with the grass in pastures they destroy it in a short time, so that farmers do not readily allow geese to have access to pastures; not to mention that, when the herbage is rendered foul by the excrements of these poultry, it becomes loathsome to other animals. The speedy injury inflicted on plants by goose-dung is occasioned partly by the uric acid it contains, and partly by the ammonia which is so soon generated and developed on decomposition. When rain happens to fall, these caustic substances are diluted, and the grass grows the best in the places where the excrements lay, as may be seen in any goose pasture.

As poultry dung is very rich in powerfully manuring matters easily soluble in water, it should be applied only in very small

quantities; and, in order to effect its due distribution, as it is generally dried strongly together, it must first be reduced into a fine state by thrashing, or other means. In Belgium they employ it particularly for manuring their flax, and calculate the annual value of the dung of 400 or 500 head of pigeons at 25 or 30 rix-dollars (about 5*l.* or 6*l.*). Poultry-dung must always be used as a top-dressing, or only harrowed in very lightly; and it should be spread over the ground when there is no wind: we should generally choose damp, but not wet weather, for the purpose, otherwise the many soluble substances would be carried too deep into the soil, or washed away altogether. If a meadow be manured with poultry-dung, and sheep driven on it soon afterwards, it is almost entirely eaten bare by them, probably on account of the many salts, including common salt, contained in this manure. Like all other manures containing much ammonia, it soon destroys moss in meadows. When it is wished not to employ poultry-dung by itself, it will be found best to mix it into a compost heap with some soil rich in humus; a soil of this kind should be used with all organic remains containing much nitrogen, as all loss is thereby prevented. How much, however, of this invaluable manuring substance (nitrogen), in the state of ammonia, is every year wasted on all farms, has been already shown in speaking of the excrements of other animals.

To the excrements of birds belongs also the dung of the cormorant or gull, which occurs in immense quantities on some islands lying off the coast of Peru, and is named Guano. It is used in Peru with the most striking effects in manuring the maize-fields. Vauquelin and Fourcroy, who undertook a chemical examination of the "Guano," found it to contain 25 per cent of urate of ammonia and urate of potash, as well as the phosphates of potash and lime, sulphate and muriate of potash, a fatty substance, and some silica. According to Klaproth it consists, on the contrary, of much humate of ammonia, common salt, phosphate of lime, some animal remains, and sand. I only adduce the Guano here, as furnishing another proof of the manuring properties of mineral bodies, particularly of humate of ammonia.

ON NIGHT-SOIL.

Although there can be no doubt that this material is one of the strongest manures, it is still in most places managed with the less care than any, and in many altogether neglected; yet the greater or less value attached to it in any country is certainly a proof of the degree in which the agriculture of that country has advanced. Where pains are taken with it, husbandry will be found in other respects excellent; where it is little thought of, the art in general

will usually be less perfect. It is to the use of this substance, drawn from reservoirs in the towns, that Belgium in a great degree owes her fertility; while in many large cities of Germany it is allowed to drain into the rivers. Since 1200 pounds' weight of it yearly may be reckoned for each unit of population, it is easy to see, where population is counted by millions, how important its application must be.

(1.) *Solid Matter.*—The illustrious Swedish chemist, Berzelius, analysed this substance, without reference, however, to the food which had been taken, and gives the following result:—

	Parts by weight.
Water	733
Bilious matter	9
Albumen	9
Peculiar extractive matter	27
Mucus, bilious resin, fat, and peculiar animal matter	140
Carbonate, sulphate, and muriate of Soda, phosphate of lime, and magnesia	12
Coarse remains of food (vegetable fibre?)	70
	1000

According to this analysis it contains more water than might have been supposed, and but 20 per cent. of elements capable of sustaining vegetation.

Berzelius found that if 1000 parts of it were burnt, the 150 parts of ashes which remained were constituted as follows:—

Carbonate of soda	8
Phosphates of lime and magnesia, with traces of gypsum	100
Sulphate of soda, with little sulphate of potash and phosphate of soda	8
Silica	16
Charred or unburnt portions	18
	150

We may be certain, however, that alumina and the oxides of iron and manganese, which occur though sparingly in food, have been here overlooked. Food, indeed, must vary the proportions above given. Where meat enters largely into the diet, there will be less silica, while rye-bread must produce it in quantity.

Although this substance contains as much water as that produced from horned cattle, it decomposes far more rapidly, which may be ascribed to the greater quantity of nitrogen, sulphur, and phosphorus contained in it. In its further putrefaction (for its

first stage takes place within the body), it developes much ammoniacal phosphuretted hydrogen sulphuretted hydrogen, and carbonic acid gas, and, therefore, when improperly managed, it loses a great amount of its powerfully manuring matter.

The best plan is to cover and mix it at once with earth abounding in humus, with which a little marl may be mixed, and so leave it to ferment. All the ammonia is thus united with the humic acid as soon as formed. This process frees it from the odour which is so great an obstacle to its employment; and when the heap has been several times stirred over, it is easily spread. In many places it is thrown into a tank with the cattle urine, together with three or four times the bulk of water, and so left to putrefy. But much ammonia is lost in the process, and a farm-labourer may well object to use such a pestilential mixture. The most common practice is, to throw this substance at once upon the dung in the manure-pit, but this is liable to objections on the score of economy and cleanliness. It is far better to cover it often, in the place where it collects, with earth, suds, &c., and then from time to time transfer it to the manure-pit. Where, as in cities, this substance has to remain long in vaults before its removal, it is well to pour in from time to time sulphuric acid (known commonly as oil of vitriol), diluted in the proportion of 20 parts of water to one part of the acid, as the sulphuric acid unites chemically with the ammonia which forms. In England, night-soil is often carried to pits, and deposited with layers of quick-lime to remove its offensive smell: having undergone the process of putrefaction, it is thrown out, in order to be employed mixed with lime for the purposes of manure. We may easily perceive, that in thus removing the objectionable odour of this substance, we must also deprive it at the same time of a great amount of nitrogen, for the action of the lime after deposing those component parts which contain nitrogen, to form ammonia, also tends to drive the ammonia away altogether. Some nitric acid will, indeed, be produced from the nitrogen of the night-soil by the access of the oxygen of the atmosphere, and in that case nitrates of lime and ammonia will be formed, but the greater proportion of the nitrogen will combine with hydrogen, and escape in the state of gas.

In China it is kneaded in the recent state with clay, formed into tablets, baked, and afterwards dried in the sun: it has then lost its fetid smell, is called "taffoo," and becomes an important object of internal trade.

In Paris, Berlin, Munich, and some other large cities, this substance, after losing its offensive odour, by putrefaction, is dried, reduced or ground into a fine powder by rolling, and then sold as a manure. This powder is called in France "poudrette." During the process, however, much of the best manure must escape.

In Paris, the fluid as well as the solid substance, are thrown together in one common reservoir, in order to undergo putrefaction, when the liquid is allowed to run off for the purpose of preparing their "urate," and the solid matter being afterwards conveyed upon large drying-plots is harrowed or hoed frequently, and then thrown into large heaps, where it is left to ferment and become heated: it is then well worked with the spade in order to remove from it all foreign bodies, such as fragments of earthenware, &c., and being again left for a certain time in large heaps, 15 or 20 feet high, is ground into powder, and finally packed in casks for the market. The "poudrette," thus prepared, has lost all smell, has the appearance of snuff, and is employed with the most striking effect as a manure for the gardens in the neighbourhood of Paris, and is even shipped to the West Indies for the use of the sugar plantations.

The action of night-soil, like that of every other manure containing much nitrogen, is very rapid in its effect, but it is also soon over. To prevent the risk of laying the crop, only a small quantity of the manure, in its unmixed state, should be used at once. The crops which it produces are more abundant in gluten than those resulting from any other animal manure. Hermbstädt found that wheat manured with it contained 30 per cent. of gluten, while that from sheep-dung contained only 22 per cent., and from humus only 11 per cent. The grass produced from manuring with night-soil diluted with water, is eaten eagerly by animals in Silesia. It answers excellently for all kinds of garden cultivation, only that it must not be applied in a fresh state to cucumbers, as it was found at Liegnitz, in Silesia, to communicate to them an unpleasant flavour. Like all manures which come quickly into operation, it should not be applied deeper than 1 or 2 inches in the soil.

(2.) *Fluid Excrements.*—Human urine contains rather more water than that of cattle; and as it also holds less urea and other manuring elements, it is not quite so valuable. It has often been the subject of most accurate chemical investigation, not in an agricultural, but in a medical point of view. These investigations, however, are available for our purpose, showing as they do, the value of this fluid for agricultural purposes, and how it must be treated in order to derive from it the greatest possible advantage: in the vicinity of great cities it is always to be had at a cheap rate and in great quantities. It was formerly collected in cities, as in Brunswick, for the preparation of sal-ammoniac; a substance now prepared more economically from other animal remains, as bones, &c., and with the exception of its employment in woollen manufactories for cleansing the wool, it is no longer used.

According to the investigations of Berzelius (who does not, how-

ever, state the kind of food taken), 100,000 parts by weight of human urine contain—

Water	93·300
Urea	3·010
Salivary matter, osmazome, lactic acid, and lactate of ammonia	1·714
Mucus of the bladder	0·032
Uric acid	0·100
Phosphate of ammonia	0·165
Muriate of ammonia	0·150
Sulphate of ammonia	0·371
Sulphate of soda	0·316
Common salt	0·445
Phosphate of soda	0·294
Phosphates of lime and magnesia, with a trace of fluate of lime	0·100
Silica	0·003
	100·000

Besides the substances enumerated in this analysis, certain portions of the following have also been found in human urine: albumen, gelatine, a resinous substance, colouring matter, fat; acetic, benzoic, and carbonic acids; sulphuretted hydrogen, muriate of lime, and oxide of iron. It passes, like the urine of other animals into rapid decomposition, developing much ammonia: it would therefore be very injudicious not to take care to secure the ammonia in combination, as in the case of cattle urine; and this may be accomplished, as already stated, either by dilution with water, or by the addition of sulphuric acid, sulphuric acid salts, or humic acid. Mixture with earth abounding with humus, when such earth can be obtained, is always the best. For this purpose the earth may be laid in heaps, and the urine poured over them until the whole of the humic acid is neutralised by the ammonia which forms, a point which can easily be ascertained by the smell; for when neutralised, the ammoniacal smell is immediately perceived: the heaps should be frequently turned over and loosened, for the purpose of allowing the water to drain away. We may proceed in the same manner with cattle urine, and so obtain a manure, surpassing in its quality the best preparation of dung. In its unputrefied state, or at least so long as it still contains caustic ammonia, it cannot be applied with more impunity than cattle-urine to green plants, as it immediately kills them, unless the soil should happen to abound with humic acid: if, therefore, we have no opportunity of allowing it to putrefy in mixture with some soil rich in humus, it can only be applied for the manuring of fields which have no crops growing on them.

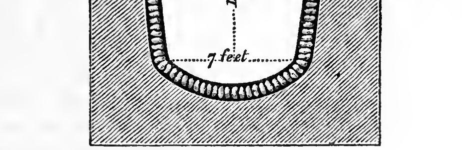
MISCELLANEOUS COMMUNICATIONS AND NOTICES.

On the Construction of Tanks.

[From Communications made to the Society by Mrs. Davies Gilbert, of Eastbourne, Sussex.]

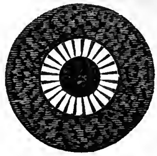
These tanks are remarkable for their simplicity, economy, and efficiency, and between thirty and forty of them have already been constructed in Eastbourne and its neighbourhood, and also many in Cornwall, as reservoirs for rain water, in districts where the drainage of the mines occasions a great deficiency in the springs.

The depth of the tanks is often 12 feet, and the excavation is circular like that of a common draw-well: the diameter, however, of the upper part being one-third greater when the hole is first dug than that of the bottom: the sides are not upright, but have a shelving inclination, which enables labourers, unused to mason-work to construct them; but where the ground is hard (as in the case of chalk) some labour in making the pits might be saved by their being larger at the bottom than at the top, as is the case with some wells.



After the excavation has been completed, the bottom of the tank is formed of either brick or stone work, or of chalk flints, bedded in with grey lime mortar, and coated with Parker's cement, no *clay* being used in any part of the tank; and the sides are then walled up in the same manner to within about one-third from the top, when the doming commences by circular layers of bricks, flints, or chalk, resting immediately on the top of the side-walling, the successive courses advancing one-third of their length beyond the previous layers, which are regularly backed in and kept from tilting during the progress of the work by

earth. When the doming reaches the surface, and the last course has been laid down, the work will present the following arrangement.



The top must then be secured by slabs of wood, four stones, or bars of iron, or mason-work a foot or two high; a circular opening being left of sufficient size for a bucket, pump, or a man to go down occasionally for the purpose of cleaning the tank. A pump is the most advantageous means of drawing out the liquid manure; but as the pump is liable to be choked by sediment, it should be movable, and raised, as the soil is deposited at the bottom, by being passed through rings fixed to a post or the nearest building; and if there are several tanks on a farm a single pump may be used for all by turns. These pumps are made of iron, copper, or zinc, by Mr. Turner, of Dorset-street, Fleet-street; and it is essential that a hole be made in the extremity of the handle to fix on a stick of wood, to enable persons standing on the ground to use the handle for the delivery of the liquid into a cask on wheels.

The expence of these tanks depends of course upon the hardness of the ground in digging, and on the kind of material used in casing the bottom and sides of the tank; namely, whether brick, stone, or flints, bedded in the best lime, mortar, or cement: but, whatever the shape may be, the cost of workmanship paid at Eastbourne has generally been 10*s*. per 100 feet of surface, for casing the bottom and sides; when brick-work is used, 4½ inch work is sufficient: if flints, from 9 inches to 12 inch work. In digging the last tank of 12 feet deep, on Mrs. Gilbert's estate, two labourers were employed seven days, and eight more days to make a drain for conveying the water from the high-road and casing and doming the tank. The doming was accomplished with the chalk-stones dug out in excavating the tank. One of the tanks at Eastbourne, about 7 feet deep and wide, has served two labourers' families with water for ten years; and the mason-work of this tank was made by three boys of only twelve years of age. One of 12 feet by 7 feet has been found sufficient to afford a constant supply of water to a large family and six horses; this was surrounded by only 4½ inch brick-work, well grouted in with good grey lime mortar, resting solid against the sides. At the Eastbourne Union House, for fourteen parishes, a tank has been made 23 feet deep by 11 feet wide, of the roughest materials, being only flint-stones; and though they require more mortar than regularly-shaped stones, only 90 bushels of lime were allowed, including two coats of plaster; and the workmanship was executed by the paupers themselves—the only essential points being, that no clay (which worms in time bore through) be used, and that the lime or Parker's cement be good. Labourers' gardens have been watered by the rain which formerly injured the public road, and now turned into a tank surrounded with 9-inch masonry, and the water drawn up by a cast-iron curb.

Ponds have been made with equal success on the same principles, dug only $4\frac{1}{2}$ feet below the surface, the excavated portions being added to the sides and covered with pebbles about one foot thick, like a road, embedded in good lime mortar.

Tanks both for soft water and liquid manure are desirable in most farm-yards.*

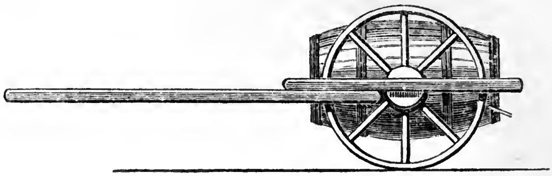
On a simple Liquid Manure Cart. By H. Wood, Esq., of Bramdean House, Hampshire.

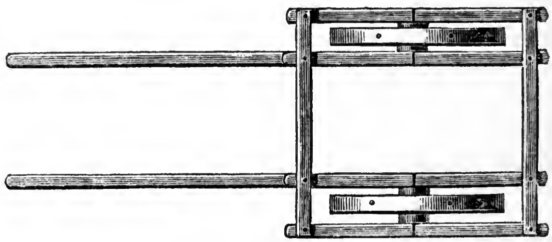
The agriculturist on the Continent contrives that the drainings of his kitchen and out-offices should empty themselves into the dung-heap, from which the surplus should be discharged and removed by a simple water-cart to his meadow or garden. The stables and cow-houses or sheds have small wells to receive the urine drained from the cattle, and the grass in summer being cut for them, the ground after each cutting is watered with the collected urine, diluted with a proper quantity of water, according to the dryness of the season. I have adopted this system in my own farm, and the stalls of my stable are sloped to iron gratings in their centres, which cover a well of a foot square, communicating with a drain constructed with the common circular pot used for draining land, and running the whole length of the stable, with a fall of about half an inch to a foot. At the end of this drain, outside the stable, I have constructed a masonry-vat to receive the urine drained from the stable, and my servant, after cleaning his horses, throws down two or three pails of water over that grating which is furthest removed from the vat, the drain being thus washed down throughout its length, and the whole kept quite clean and free from smell. The drains of my house and scullery are above ground, and run into the dung-heap, which is thus always kept moist; and the salt and grease contained in the washings of the house are absorbed by the dung, which, without this aid in dry weather, would not be converted into manure. The advantage of this arrangement is, that nothing is wasted, and there is no necessity for the various contrivances in use to destroy the smell of sinks, which are such nuisances to most houses; for the pump being at the head of the house-drain, my servants are enabled to wash down the latter daily without any trouble, and in dry weather to keep the dung-heap moist. When the vat attached to the stable is filled, I have the contents removed to the cart, which is removed with the aid of a horse or two men, to the meadow. I have adopted a similar plan in my farm-yard for securing the most valuable part of the manure in winter, when the dung is unable to absorb the rain, by the construction of a vat to receive the surplus drainings.

My water-cart consists of a wine-pipe, mounted on a pair of Indian wheels without an axle, and consequently placed so low that a person

* The Rev. Mr. Rham, in his "Outlines of Flemish Husbandry," page 80, and art. "Dairy," in the Penny Cyclopædia, has recorded the estimation in which liquid manure tanks, or vaulted cisterns under the cow-houses, are held in Belgium.

is enabled to fill it with ease while standing on the ground. The following sectional elevation and plan are drawn to a scale of a quarter of an inch to the foot.





The greatest advantage of this plan is, that little iron is required in its construction, the weight of the axle-tree being also saved. In point of strength it has all the advantages of the common pulley, for the iron which supports the wheel is only one inch thick, and would support any weight which two or three horses could draw.

Bramdean House, near Alresford,
June, 1840.

On the Failure of the Red Clover. By George Turner, Esq.

To the Secretary of the Royal Agricultural Society of England.

Sir,

Having heard strong complaints from different agriculturists of the loss of the red clover plant, and having experienced that loss on my own farm very often, where there was the very best plant at harvest, and that too on the best soils in good condition, I beg to offer you the result of my own experience for more than 20 years on this subject; which is this—that in nineteen cases out of twenty its failure is entirely owing to the stubble being fed bare after harvest, and the plant being so weakened thereby, as to prevent its standing the wet and cold of the succeeding winter. I have so repeatedly proved this on various soils that I have not a doubt on the subject; for in every instance where I have not fed it off in the autumn, that piece has been the admiration of every one the following spring.

In this last season I have again had proof of it. A farm at Michaelmas last came into my occupation, on which, last April, I sowed 40 acres, in six closes, with precisely the same seed of my own growth; viz. rye grass, and red and white clover, mixed. It so happened that three of the fields, of about 20 acres of the best land, the late tenant fed bare up to Michaelmas; and the remaining three fields of 20 acres I purchased, and fed but little. At this time, on the last three, there is a beautiful plant of red clover; but on the former scarcely a blade to be seen besides rye grass and a little white clover.

Such has been the result in this instance, and every other which has come under my observation; and if you think it worth a place in the Journal of the English Agricultural Society, I shall be gratified by in any way being a useful member of it; and have the honour to be,

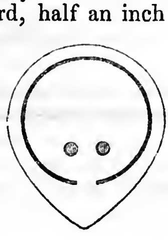
Sir,
Your obedient servant,
GEORGE TURNER.

Barton, near Exeter, April 9th, 1840.

On the Management of Bees. By THOMAS WARD JESTON, Esq., Henley-on-Thames.

I HAVE found by experience my plan for the management of bees, and mode of taking their superfluous honey, without destroying the parent hive, fully to succeed: in a bee-country it will afford the cottager a very ample return for his trouble, and not require so much watching as the old plan—for the older the hive is, the less chance will there be of swarming, but the greater chance of a large deposit of honey. I have kept bees more than twenty years; have tried Huish's, Nutt's, and various other plans; but the one suggested by this industrious insect itself I have found to be the most simple, cheap, and successful, and will not cost the cottager more than sixpence to adopt, in addition to his old hives.

Some years ago I placed an empty butter-tub under the board on which the hive rested: the sun cracked the board, and the bees, enlarging the opening, took possession of the tub, and, after filling their own hive, deposited 26 lbs. of honey and comb in the tub below. This I took possession of for my own use, leaving their hive full of honey for their winter's consumption. By improving on this simple plan I have carried off the prizes for honey at the Henley Horticultural Society for the last four years. A board, half an inch in thickness, 18 inches in



width, and perforated with two holes, each an inch in diameter, is placed between the hive and the butter-tub. The tub should be placed under the hive as early as March; the bees having a great dislike to any disturbance of their arrangements. I last year took upwards of 40 lbs. of honey in this way, although the season was so bad, and an ample supply of food was left for the bees to subsist on during the winter. This plan will prove a good substitute for the "rear" used to enlarge the common hive; with this advantage, that a supply of honey can be obtained from the strong swarms as well as the old hives.

I have never found occasion to feed the bees from which honey had been taken in the mode described; but previously to the adoption I was in the habit of feeding them with coarse sugar boiled with beer and a little old wax-comb, to the consistence of a syrup. As an experiment I once fed some bees with treacle, made from grating 112 lbs. of beet-root, expressing from it one gallon of juice, and boiling this with one tea-spoonful of sulphuric acid (commonly called oil of vitriol) and three tea-spoonfuls of common chalk, or whiting in powder, which will clarify it and throw off all impurities, leaving, on evaporation, a clear syrup fit for feeding bees.

There is little or no gorse or heath near Henley, and the character of the country is arable. The market-price of virgin-honey (such as is obtained on my plan) is in the town from 1*s.* 6*d.* to 1*s.* 8*d.* per pound, and the wax from 1*s.* 6*d.* to 2*s.*

The following are the weights of seven hives, taken in April 1838, from which honey had been taken in the previous autumn, and yet the season of 1838 proved so bad that I obtained no honey that autumn, and two of the hives perished in the following winter:—

Hive No.	1.	28 lbs.
,,	2.	28 ,,
,,	3.	25 ,,
,,	4.	25 ,,
,,	5.	24 ,,
,,	6.	23 ,,
,,	7.	22 ,,

This season my five old hives, and Nutt's Hive also, are in full vigour and operation.

Henley-on-Thames, Oxfordshire,
May, 1840.

Account of a Cotton-like Substance, resulting from an Inundation of the Thames.

In the autumn of last year some meadows in the hamlets of Littleworth and Thrupp, near Faringdon, in Berkshire, were overflowed by the Thames, and remained under water until February of the present year. When they became dry there lay upon seven acres of this ground a vast white sheet of fibrous substance, resembling cotton wadding, which gave the land at a distance the appearance of being covered with snow. Portions of this substance were sent, as a matter of curiosity, to be spun and woven, and were actually converted into articles of apparel. A roll of the deposit, about a yard in width and two in length, having been presented to the Society, for its museum, by the proprietor Thomas Mills Goodlake, Esq., portions thereof were communicated to the Linnean Society and to the Royal Dublin Society: and the following answers received:—

From the Linnean Society.

The specimen which you sent me is one of the *Algæ confervoideæ*, and is, I believe, identical with the *Oscillatoria corium* of Agardh. I have had specimens from near Exeter, where the plant had extended itself to upwards of 70 feet in an old water-course. The mass was of considerable width. Its hygroscopic property is too great to admit of its being employed for domestic purposes.

David Don, *Librarian.*

Soho Square, June 4, 1840.

From the Royal Dublin Society.

The cotton-like substance communicated by the Marquess of Downshire is not very unfrequent on large spongy bogs in the north of Ireland, especially after a continuation of wet weather, and a sudden evaporation caused by heat and drought; though seldom so perfect as the specimen sent.

It is the *Conferva sordida* of Dillwyn, and figured in his beautiful work on Algæ; also in English Botany and Flora Danica. It is a kind of *fresh*-water *sea*-weed, in short.

Edward Hardman, *Secretary.*

Dublin, June 1840.

The Duke of Richmond also referred a portion to Robert Rigg,

Esq., F.R.S., a member of the Society, who subjected it to chemical analysis, and it was found to be constituted as follows:—

Vegetable matter . .	45·4	Carbon	20·14
		Hydrogen	3·76
		Oxygen	19·94
		Nitrogen	1·56
Earthy matter . . .	54·6	Carbonate of lime .	41·6
		Sand and clay . . .	10·26
		Salt and potassa . .	2·67

END OF VOL. I.

London: Printed by William Clowes and Sons, Stamford Street.

ENGLISH AGRICULTURAL SOCIETY,

5, Cavendish Square.

English Agricultural Society.

DEC. 18th, 1838.

REPORT OF THE COMMITTEE.

IN making this, their first Report, your Committee cannot refrain from noticing that the short space of time which has elapsed since the establishment of the English Agricultural Society has necessarily limited the sphere of their labours, and has, in fact, precluded them from doing much more than laying the foundation for future operations; but being anxious that such steps as they have taken for promoting the objects of the Society should be submitted to those who, placing confidence in them, have entrusted to their care the important duty of conducting its affairs, they deem it a duty incumbent upon them to lay before the Subscribers the result of their management since their appointment on the 27th of June last. They cannot, however, proceed to the statement of their own labours without first tendering their thanks to the Provisional Committee for the valuable exertions made by them in framing rules for the general conduct of the Society. As, however, must be the case in every institution which embraces an extensive field of operation, it would be impossible for any single Committee, however diligent and zealous, to attend to all the details of the business to be transacted, one of the first acts of the Committee was the appointment of Sub-Committees, to carry into effect the objects of this Institution. One of these Sub-Committees, whose province it was to frame additional rules for the government of the English Agricultural Society, has suggested many valuable rules, which have been adopted. It will shortly resume its sittings, and will direct its attention to framing such further rules and regulations as the daily-extending connexions of the Society may render necessary.

Being desirous, as early as possible, to enlist talent in the investigation of those subjects which involve matters of deep interest to the practical farmer, prizes for essays upon a variety of topics have been offered, some of which will be awarded this day, some at the meeting at Oxford next year, and others at the country meeting to be held in the year 1840. The majority of those prizes are upon subjects directly calculated to improve the cultivation of the soil, an object regarded with special interest by the English Agricultural Society. The prizes for cattle to be given at the Oxford meeting, and through which improvement in the *breeding* of stock is mainly contemplated, will be publicly announced in a few days; and your Committee trust that the owners and occupiers of land in Oxfordshire and the neighbouring counties will co-operate in rendering the first meeting of this Society efficient for the objects for which it was instituted.

Aware of the immense loss sustained in consequence of the want of better knowledge in the treatment of the diseases of cattle, sheep, and pigs, the attention of the Committee has been turned to this subject, in order, if possible, to devise means for supplying the deficiency. A veterinary school has been long established in the neighbourhood of the metropolis, and it has been most useful in teaching the scientific and successful treatment of the diseases by which thousands of horses used to be destroyed; but its attention has been almost exclusively devoted to the horse; and it was considered that, if its labours could be directed with the same success to the management, in health and disease, of our cattle and sheep, it would be of inestimable advantage to the British farmer.

Application has been made to the Governors of the Veterinary College, stating the anxious wish of the English Agricultural Society that this most important extension of its inquiries and its benefits should take place, this Society not interfering with the arrangements and proceedings of the governors of the college, but contributing from its funds to the accomplishment of this purpose.

A most favourable answer has been received from some of the governors; and a meeting will soon take place between them and a delegation of your Committee, from which the happiest results may be anticipated.

Correspondence with agricultural, horticultural, and other scientific societies, both at home and abroad, being one of the means proposed whereby useful information may be obtained, a proposition has been made for opening a correspondence with several societies at home; from most of which, but most especially from the Highland and Agricultural Society of Scotland, your Committee has received the strongest assurances of a desire to establish a friendly communication with your Institution.

Through the assistance of an able member of your Society, who has recently been travelling on the continent of Europe, arrangements have been made for opening a correspondence with the Royal and Central Agricultural Society at Paris, the Royal Agricultural Society at Lyons, the Agricultural Society at Geneva, and the Agricultural Society at Lille.*

The diffusion of agricultural information being one of the most important means whereby the English Agricultural Society hopes to attain the objects contemplated by its establishment, diligent consideration has been given to this subject; and your Committee feels confident in stating that, early in the coming year, a plan will be adopted for circulating as extensively as possible such papers as may be deemed calculated to furnish useful information to the farmer.

Upon referring to the Report made by the Provisional Committee on the 27th of June last, it will be seen that at that time the number of governors who had joined the Society was 186, of whom 65 were life governors, and 121 annual subscribers of 5*l.* each. That there were in addition 280 members, of whom 31 were life members and 249 annual subscribers: making a total

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* Arrangements have also since been made for opening correspondence with the foreign societies of Toulouse and Bourdeaux.

of 466. That the sum received amounted to 2526*l.* 1*s.*; and that there had been expended about 130*l.*; leaving a sum of 2396*l.* 1*s.* in the hands of the bankers, Messrs. Drummond and Co., besides a further sum of 2057*l.* due from subscribers.

At the present time the number of governors is 206, of whom 68 are life governors, and 138 annual subscribers of 5*l.* each. There are besides 484 members, of whom 46 are life members and 438 annual subscribers: making a total of 690; and exhibiting an increase of 224 since the 27th of June last.*

Your Committee have the pleasure to announce that a considerable number of new subscribers are about to join the Society; and the attention of local societies being daily more and more directed to it, a further accession of subscribers may be reckoned upon.

The sum already received for subscriptions amounts to 3739*l.*, and there has been expended 676*l.* 13*s.* 7*d.*, leaving a balance of 3062*l.* 6*s.* 5*d.* in favour of the Society, besides the further sum of 1196*l.* in the course of collection.

The income of the Society, arising from annual subscriptions, now amounts to 1128*l.* The receipts and expenditure since its establishment, as exhibited in a balance-sheet, examined and approved by your Finance Committee, is subjoined.

Your Committee cannot conclude their Report without making grateful mention of those subscribers who have kindly enabled the Society to commence the formation of a library by presenting useful works.

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* The number of governors is now 221, and of members 726; making a total of 947.

ACCOUNT OF THE RECEIPTS AND EXPENDITURE OF THE SOCIETY.

Dr.

	£.	s.	d.
To Advertisements	117	6	8
Stationery	27	5	8
Furniture	100	7	0
Postage	2	0	1
Carriage of Parcels	7	5	3
Housekeeper	19	17	11
Lithography, Printing, &c.	75	14	6
Books	3	3	0
Maps	4	8	0
Assistance in folding and delivering Prospectuses	6	10	0
Report of Meeting on 27th of June last	2	2	0
Expenses at Freemasons' Tavern	9	0	0
Salaries	100	0	0
Rent	196	17	6
Coals	4	16	0
Secretary, for current Expenses	50	0	0
Amount invested in the Funds	2000	0	0
Amount in Bankers' hands	947	14	6
Petty Cash in Secretary's hands	70	11	11
	£3745	0	0

Cr.

	£.	s.	d.			
By Life Governors	2500	0	0			
Governors	530	0	0			
Life Members	410	0	0			
Members	299	0	0			
				3739	0	0
Amount over-paid				6	0	0
				£3745	0	0

QUERIES ON THE USE OF LIME AS A MANURE.

Drawn up by J. W. Childers, Esq., M.P., and adopted by the Committee of Management.

The Doncaster Agricultural Society, of which Earl Spencer was president, in the year 1828 decided on turning their attention to other subjects besides the exhibition of stock; and it occurred to them that a very desirable mode of gaining accurate information on agricultural subjects would be to draw up queries, and to send them round to farmers and others likely to give information. The substance of the answers was then embodied in a Report.

It was thought that by this means knowledge of a very valuable character might be obtained, inasmuch as it would not merely be the opinion or experiments of an individual, however talented and accurate he might be, but the combined experience of a number of persons. Thus the errors and mistakes of one could be corrected by the statements of others.

This experiment was successful and satisfactory. The Society published, in successive years, Reports on Bone Manure, on Mangel Wurzel as a Fallow Crop, and on the Turnip-Fly.

The Committee of the English Agricultural Society have decided to pursue the same plan; and it is hoped that the extent of the Society, together with its power of commanding greater editorial ability, will enable it to prosecute the system more efficiently.

The subject adopted for the first inquiry is one of very great extent (and though much has been written on it, still great doubt remains),—" The application of Lime as a Manure."

It may not perhaps be so interesting as some other subjects that might have been proposed, but, from the general diffusion of limestone all over England, it ought to excite attention in every county.

Lime is so various in its qualities, and its effects are so contradictory on different soils, that its application as a manure is as much undervalued by some as it is extolled by others.

The object being to obtain the results of experience, under the many variations of soil, climate, culture, and other circumstances which this country affords, the Committee hope that the number, as well as the accuracy, of the answers will be such as may correspond with the extent of the subject; and that active agriculturists may be disposed in this way to second the views of the Society, by assisting in the collection of authentic facts, on the due examination of which alone, agriculture, like other sciences, can be firmly established.

Queries.

1. How many years have you used lime as a manure?
2. How many acres have you limed each year?
3. What quantity have you put on per acre?
4. On what sort of soil?
5. At what time of year?
6. For what crop?
7. Whether with or without manure?
8. In what manner applied?
9. What effect on the crop?
10. What effect on the succeeding crop?
11. What was the price of the lime?
12. Do you continue to use it?
13. What is the chemical description of lime you use?
14. State generally any particulars with respect to lime.

Normal Experiment on the Comparative Effect of different Manures upon Turnips, &c.; and on the Comparative Yield of different Turnips, under similar Dressings.

	Swedes.	Aberdeen Yellows.	Mangle Wurzel.	Globes.	Tankards	Any other Turnips.
Bones 10 bushels						
Bones 20 bushels						
Bones 30 bushels						
No Manure . . .						
Rape Dust. . . .						
Dung						
Any other Manure						

Each compartment to consist of one quarter or one half of an acre.

Members of the Society are earnestly requested to further its objects by causing this experiment to be tried on their own farms, and by sending an accurate account of the weight of the crop to the Secretary, with a statement of the previous cropping, soil, and subsoil.

These accounts will be compared, and the principal points published. The value of the result will obviously depend on the number of the experiments, and on the accuracy with which they are stated.

ENGLISH AGRICULTURAL SOCIETY.

RULES.

.. The English Agricultural Society consists of a President, twelve Trustees, twelve Vice-Presidents, Governors, and Members.

2. The President is annually elected, and is not re-eligible for three years.

3. The President, Trustees, and Vice-Presidents, are elected from the Governors.

4. The Governors pay 5*l.* annually, the members 1*l.*, with the power to compound for life by the payment in one sum of ten annual subscriptions.

5. The Committee of Management consists of the President, Trustees, Vice-Presidents, and fifty Subscribers; twenty-five of whom go out annually by rotation, but may be re-elected.

6. The Committee have the power of appointing sub-committees of any subscribers to the Society, of all which sub-committees, the President, Trustees, and Vice-Presidents are members *ex officio.*

7. One general annual meeting will be held every year in London, in the month of May; and one in the country, in the months of July or August.

8. The Committee and all the officers are elected at the annual meeting in London, but do not enter upon the duties of their respective offices until after the annual meeting in the country.

9. All governors and honorary members have the power of attending meetings of the committee, but have not the privilege of voting unless forming part of that committee.

10. Every candidate for admission into the Society as governor or member must be proposed by a subscriber. The proposer to specify in writing the name, rank, and usual place of residence of the candidate; and every such proposal to be read at the first meeting of the committee next after such candidate shall have been proposed, and every such candidate to be eligible at the then succeeding meeting.

11. No subscriber shall enjoy the privileges of the Society or attend the meetings, whose subscription shall be in arrear.

12. The Committee of Management will meet every Wednesday at twelve o'clock for the discharge of business, three to be a quorum; but no grant of money shall be made at any such meeting, nor shall any business of importance be considered as fully decided upon until confirmed at a subsequent monthly meeting.

13. The meeting on the first Wednesday in every month shall be the monthly meeting, five to be a quorum, when the general business of the Society shall be transacted, grants of money made, reports of sub-committees considered and confirmed, if approved.

14. At all meetings of the committee when the quorum is assembled

in the absence of the President, the Trustee, or Vice-President of the highest rank shall take the chair. If no Trustee or Vice-President be present, the meeting will elect their chairman.

15. The first business at each meeting of the committee to be the reading of the minutes of the preceding meeting.

16. In case of an equality of votes, the question to be decided by the casting vote of the chairman.

17. All drafts for money shall be signed by the chairman of the committee and countersigned by one of the Trustees and the Secretary, but only on the recommendation of the Committee of Finance.

18. The Committee may at any monthly meeting discontinue the weekly meetings of the Committee for any period not exceeding two months.

19. No prizes shall be allotted except at the monthly meetings in May, June, and July.

20. No rule or bye-law shall be altered unless due notice of such change shall be given at a meeting of the Committee, and carried at the two subsequent monthly meetings.

21. Subscriptions are paid in advance, and are due on January 1st; but subscribers elected in December are liable only for the year ensuing.

22. It is a fundamental rule of the Society, that no question shall be discussed, at any of its meetings, of a political tendency, or which shall refer to any matter to be brought forward or pending in either of the Houses of Parliament.

RULES OF COMPETITION FOR PRIZES.

1. That all information contained in prize essays shall be founded on experience or observation, and not on simple reference to books, or other sources.

2. That drawings, specimens, or models shall accompany writings requiring them.

3. That all competitors shall transmit a sealed note, containing their names and addresses, with a motto on it to correspond with one inscribed on the essay.

4. That the Society shall have the power to publish the whole or any part of the essays which gain the prizes, and the other essays will be returned on the application of the writers.

5. That the Society is not bound to give an award, unless they consider one of the essays worthy of a prize.

6. That, in all reports of experiments, the expenses shall be accurately detailed.

7. That only the imperial weights and measures are those by which calculations are to be made.

8. That no prize be given for any essay which has been already in print.

9. That prizes may be taken in money or plate at the option of the successful candidate.

All Essays must be sent to the Secretary, 5, Cavendish Square.

ESSAYS AND REPORTS ON VARIOUS SUBJECTS.

ESSAYS FOR THE MEETING IN 1839.

1. DRAWING TURNIPS.

Ten Sovereigns will be given for the best account of the advantages of drawing Turnips from the Land, and consuming them in Houses or Yards.

Competitors must state—

1. The best mode of drawing and carrying turnips both from light and heavy soils.
2. The means of avoiding any injury to the future crops from cutting up the land in carting, more particularly in clay soils.
3. The best mode of supplying the loss of manure arising by the turnips not being consumed on the land.
4. The comparative progress of stock in fattening or thriving, when consuming drawn turnips or those still on the land.
5. The comparative quantity or quality of the manure in either of the above modes.
6. The expense of drawing.

2. WHEEL AND SWING PLOUGHS.

Ten Sovereigns will be given for the best Essay on the comparative advantages of Wheel and Swing Ploughs.

3. WATER-MEADOWS.

The Society's Gold Medal will be given for the best account of the formation and management of Water-meadows, founded on actual experience.

Competitors must give—

1. A description of the water and its qualities.
2. The means by which it has been collected and brought to the meadow.
3. The quantity and quality of the grass mown, and the purposes for which used.
4. The amount of stock (if any) depastured, and at what time of the year.
5. The botanical and common names of the grass growing.
6. The expense of formation and management.

The size of the water-meadows described must be not less than five acres.

4. VARIETIES OF WHEAT.

Twenty Sovereigns will be given for the best account of the most approved varieties of Wheat hitherto introduced into England.

Competitors must state—

1. The mode of procuring the sorts of wheat described.
2. Their culture, viz., preparation and quantity of the seed; time and method of sowing; relation both as to preceding and following crops, and as to varieties of soil.
3. Hardihood and power to withstand severe winters.
4. Early maturity and time of severance of crops.
5. Tendency to degenerate, and liabilities to disease.
6. Amount of produce in grain, chaff, and straw, and the relative quantities and qualities of flour and offal.

5. KEEP OF FARM HORSES.

Twenty Sovereigns will be given for the best account of the cheapest way of keeping Farm Horses, both in Winter and Summer.

Competitors must state—

1. The quantity of food given, and the average price or value of such food.
2. The work performed by the horses.
3. The length of time they have been kept on the food described;
4. And whether kept in yards, or stables, or in pastures.

6. RURAL ECONOMY ABROAD.

The Society's Gold Medal and Twenty-five Sovereigns will be given for the best account of Rural Economy abroad.

7. STALL-FEEDING CATTLE.

Twenty Sovereigns will be given for the best account of Stall-feeding Cattle.

8. WINTER AND SUMMER MANURE.

Ten Sovereigns will be given for the best account founded on actual experiment of the comparative qualities of Winter and Summer-made Manure.

Competitors must state—

1. The comparative value of fold-yard manure made from green food and litter during the summer months, or that produced by roots and litter during the winter, in strength, richness, and durability with reference to the crops to which they are respectively applied.
2. The general economy of the respective processes.

9. LIQUID MANURE.

Ten Sovereigns will be given for the best account of Liquid Manure.

10. COMPOST HEAPS.

Ten Sovereigns will be given for the best mode of making Compost Heaps.

These Essays must be sent in to the Secretary, on or before March 1st, 1839.

ESSAYS FOR THE MEETING IN 1840.

1. STORING TURNIPS.

Ten Sovereigns will be given for an account, founded on experience, of the best mode of Storing Turnips, by which they may be preserved in their natural state till the April or May succeeding the time of their being taken up.

Competitors are required to state—

1. Their experience of the methods now in practice for Storing Turnips, viz., on the surface of the soil, in pits, in sheds, or in houses.
2. The different sorts of covering, and their thickness.
3. The depth of pits.
4. The relative keeping virtues of different species, whether of Swedes or of common turnips.
5. The best modes of taking up and cleaning, with reference to their preservation.
6. Any new methods recommended.

2. ADMIXTURE OF SOILS.

Twenty Sovereigns will be given for the best account of the Transposition and Admixture of Soils, as in the application of a clay dressing to a light sand.

Competitors must state the results of actual experiments.

3. EARLY SPRING FEED.

Twenty Pounds will be given for the best Essay on the Grasses and Leguminous Plants best adapted to arable cultivation for early feed in the spring.

The points of comparison to which the Society would wish the attention of competitors for this prize to be mainly directed are the following—

1. Earliness of vegetation.
2. Power of resisting severe frost.
3. Abundance of produce.
4. Nutritive quality.
5. Effect on the soil and on the succeeding crop.
6. The method of cultivation.

The species or variety of the plants sown should be accurately designated, and also the quality of the soil on which they have been grown.

4. INSECTS INJURIOUS TO CEREAL CROPS.

Twenty Pounds will be given for the best account of the Insects prejudicial to the Cereal Crops:—viz., wheat, barley, oats, and rye, in their different stages of growth. The descriptions of the insects must be entomological, and any remedies proposed must be the result of actual experiment.

5. PLANTATIONS.

The Gold Medal will be given for the best account of the forest trees, best fitted for plantations in England.

Competitors must state—

1. The trees best suited to various soils of inferior description, distinguishing each sort as clay, peat, chalk, sand.
2. Whether the trees should be mixed together or in separate masses.
3. The best mode of planting, and expense.

6. UNDERWOOD.

The Gold Medal will be given for the best account of the Cultivation and Management of Underwood founded upon actual experiment.

Competitors are required to state—

1. The nature of the soil, and when it has been recently planted, the mode of preparing it.
2. The average number of plants per acre.
3. The description of underwood growing.
4. The best sorts to be planted.
5. The cost of fencing and draining.
6. The comparative produce of not less than five acres under the common, and under an improved system of management.

7. ROTATION AND CROPS.

Ten Sovereigns will be given for an account of the Rotation of Crops best suited to heavy lands.

The object of this inquiry will be, the combination, within a given period, of the greatest number of crops, including winter and half-crops consumed before they arrive at maturity, with profitable return, and with improvement of the condition of the soil.

8. WEEDS IN MEADOWS.

Twenty Sovereigns will be given for the best account of the Weeds in Meadows and Pastures.

Competitors must state—

1. What weeds are found in old pastures and in newly laid down grasses respectively.
2. The effect of these weeds on the animals who feed on them.
3. More particularly the effect on the milk of cows, and on the butter and cheese produced from that milk.
4. The comparative value of the butter and cheese from pastures and artificial grasses infested with weeds, and from those which are clear of them.
5. The best mode of eradicating such weeds from pastures, from meadows and from artificial grasses.

9. GYPSUM AS A MANURE.

Ten Sovereigns will be given for the best account of the application of Gypsum as a Manure to artificial Grasses; stating—

1. The period and mode of application.
2. The state of the crop and nature of the grass.
3. The comparative produce of crops to which gypsum has, and has not, been applied.

10. DISEASES OF WHEAT.

Fifteen Sovereigns will be given for the best Essay on Smut, Mildew, and Diseases affecting the Crop in its more advanced stages.

1. How far derivable from internal or external causes.
2. First intimation of their presence, under what circumstances, and in what soils they are most prevalent.
3. How far prevented by preparation of soil or seed.
4. What treatment is recommended to arrest their progress.

These Essays must be sent in to the Secretary on or before March 1, 1840.

AGRICULTURAL IMPLEMENTS.

1. DRAINING PLOUGH.

Fifty Sovereigns will be given for a Plough which shall have been proved, to the satisfaction of the Society, to be adapted for the cheap and effectual cutting of Drains intended to be constructed with tiles, stones, or other materials with the least injury to the neighbouring surface of the field. This prize will be awarded in 1839.

2. GORSE CRUSHING MACHINE.

Twenty Sovereigns will be given for the cheapest and most effective Gorse Crushing Machine.

1. The machine produced must be on a working scale, and at a cost that will be attainable by the occupiers of the smallest farms.
2. It must be capable of reducing the material to a pulpy state for the mastication of ruminating animals, as cows and sheep: this prize will be awarded in 1840.

3. ANY IMPLEMENT.

For the invention of any new Agricultural Implement, such sum as the Society may think proper to award.

AGRICULTURAL OPERATIONS.

SUBSOIL PLOUGH.

Twenty Sovereigns will be given for the most satisfactory application of the Subsoil Plough to the improvement of land, whether for the purpose of correcting excessive moisture or dryness of soil.

The Society will require from competitors—

1. An accurate description of the plough used.
2. Of the quality and state of soil and subsoil, with an estimate of its annual value before the commencement of the operation.
3. An account of the drains cut (if any) their depth and distance from each other.

4. A detailed statement of the subsoil and other ploughings to which the grounds have been subjected.
5. An account of any manure expended.
6. Of the bulk of produce of each crop.
7. Of the total expense of the operation so far as it has proceeded, and
8. An authentic estimate of the improved value of the land resulting therefrom: this prize will be awarded in 1840.

2. SUBSOIL AND TRENCH PLOUGHING.

Twenty Sovereigns will be given for the most satisfactory experiment on the comparative merits of Subsoil and Trench Ploughing.

The same conditions apply to this prize as to that which immediately precedes it. It is only necessary further to state that as the object of the Society is to ascertain, as far as possible, the advantages of the two processes, namely, subsoil ploughing, in which the subsoil is divided by the plough but left in its original situation, and trench ploughing, in which the subsoil is not only divided, but is also brought to the surface; they strongly recommend to competitors that the two processes should be conducted on a piece of ground fairly divided into two lots, of equal quality, and that the drains cut in each lot, as well as any assistance afforded by manure, should be similar on each of the lots: this prize will be awarded in 1841.

CATTLE.

Prizes for Improving the Breed of Cattle.

Class I.—Short-Horns.

1. To the owner of the best Bull . . . Thirty Sovereigns.
2. To the owner of the best Cow in milk . . Fifteen Sovereigns,
3. To the owner of the best in-calf Heifer, not exceeding three years old . . . . . Fifteen Sovereigns.
4. To the owner of the best Yearling Heifer . Ten Sovereigns.
5. To the owner of the best Bull Calf . . . Ten Sovereigns.

Class II.—Herefords.

1. To the owner of the best Bull . . . Thirty Sovereigns.
2. To the owner of the best Cow in milk . . Fifteen Sovereigns.
3. To the owner of the best in-calf Heifer, not exceeding three years old . . . . . Fifteen Sovereigns.
4. To the owner of the best Yearling Heifer . Ten Sovereigns.
5. To the owner of the best Bull Calf . . Ten Sovereigns.

Class III.—Devons.

1. To the owner of the best Bull . . . Thirty Sovereigns.
2. To the owner of the best Cow in milk . . Fifteen Sovereigns.
3. To the owner of the best in-calf Heifer, not exceeding three years old . . . . . Fifteen Sovereigns.
4. To the owner of the best Yearling Heifer . Ten Sovereigns.
5. To the owner of the best Bull Calf . . Ten Sovereigns.

Class IV.—Cattle of any Breed, or Cross,

not qualified for the foregoing Classes.

1. To the owner of the best Bull . . . Thirty Sovereigns.
2. To the owner of the best Cow in milk . . Fifteen Sovereigns.
3 To the owner of the best in-calf Heifer, not exceeding three years old . . . . . Fifteen Sovereigns.
4. To the owner of the best Yearling Heifer . Ten Sovereigns.
5. To the owner of the best Bull Calf . . Ten Sovereigns.

Class V.—Cattle for Dairy Purposes.

1. To the owner of the best Cow in milk, which shall, in the opinion of the Judges, be best calculated for dairy purposes . . . Fifteen Sovereigns.

To the owner of the second best Cow . . . Ten Sovereigns.

N.B.—In awarding these Prizes the Judges will be requested to take into their consideration not only the quantity and quality of the milk which the cow gives, but also her value to feed after she shall have been dried.

Class VI.—Oxen.

1. To the owner of the five Oxen bought since the 1st of September, 1838, likely to weigh more than 70 stone at Christmas, 1839, which in the opinion of the Judges will pay best for grazing . . . . Twenty Sovereigns.
2. To th owner of the five Oxen bought since the 1st f September, 1838, not likely to exceed 70 stone weight at Christmas, 1839, which in the opinion of the Judges will pay best for grazing . . . . Twenty Sovereigns.

Class VII.—Horses.

1. To the owner of the best Cart Stallion . . Twenty Sovereigns.
2. To the owner of the best Cart Mare and Foal. Ten Sovereigns.
3. To the owner of the best Stallion for breeding hunters, carriage-horses, or roadsters, which shall have served mares during the season of 1839, at a price not exceeding 3*l.* each . Thirty Sovereigns.

SHEEP.

Prizes for Improving the Breed of Sheep.

Class VIII.—Leicester.

1. To the owner of the best Shearling Ram . Thirty Sovereigns.

To the owner of the second best ditto . . . Ten Sovereigns.

2. To the owner of the best Ram of any other age Thirty Sovereigns.
3. To the owner of the best pen of 5 Ewes with their Lambs . . . . Ten Sovereigns.
4. To the owner of the best pen of 5 Shearling Ewes . . . . Ten Sovereigns.

Class IX.—South Downs, or other short-wooled Sheep.

1. To the owner of the best Shearling Ram .	Thirty Sovereigns.
To the owner of the second best ditto . .	Ten Sovereigns.
2. To the owner of the best Ram of any other age	Thirty Sovereigns.
3. To the owner of the best pen of 5 Ewes with their Lambs	Ten Sovereigns.
4. To the owner of the best pen of 5 Shearling Ewes	Ten Sovereigns.

Class X.—Long-woolled Sheep,

not qualified to compete for Class VIII.

1. To the owner of the best Shearling Ram .	Thirty Sovereigns.
To the owner of the second best ditto . . .	Ten sovereigns.
2. To the owner of the best Ram of any other age	Thirty Sovereigns.
3. To the owner of the best pen of 5 Ewes with their Lambs	Ten Sovereigns.
4. To the owner of the best pen of 5 Shearling Ewes	Ten Sovereigns.

N.B.—The Sheep exhibited for any of the above Prizes must not be shorn before the 1st of May, nor after the 1st July, 1839.

Class XI.—Pigs.

1. To the owner of the best Boar	Ten Sovereigns.
2. To the owner of the best Sow	Five Sovereigns.
3. To the owner of the best pen of 3 Pigs of the same litter, above 4 and under 9 months old.	Ten Sovereigns.

Class XII.—Extra Stock, Implements, Roots, and Seeds.

For Extra Stock of any kind, not shown for any of the above Prizes, and for Implements, Roots, Seeds, &c., Prizes will be awarded and apportioned, by the Committee and Judges, to the value, in the whole, of	Fifty Sovereigns.

SEED WHEAT.

To the Exhibitor at the Oxford Meeting of the best 12 bushels of White Wheat, of the harvest of 1838, grown by himself	Fifty Sovereigns.
To the Exhibitor at the Oxford Meeting of the best 12 bushels of Red Wheat, of the harvest of 1838, grown by himself. . . .	Fifty Sovereigns.

N.B.—These Prizes will be awarded at the General Meeting in December, 1841.

The two best samples, without distinguishing between the two, will be selected by Judges appointed at the Oxford Meeting, and will be sown in the Autumn of 1839, by three farmers, under the direction of the English Agricultural Society, who will make their Report, upon which the Prize will be awarded. Ten Sovereigns will be given to the Exhibitor of the

one of these two samples who shall not obtain the Prize, or, if from the produce when sown neither of the two shall appear to deserve a Prize, Ten Sovereigns will be given to the Exhibitors of each.

GENERAL REGULATIONS.

No Stock can be admitted for exhibition unless the necessary Certificates, in the form prescribed, and signed by the Exhibitor in the manner directed, be delivered to the Secretary, or sent post paid, so as to reach the Society's Rooms, 5, Cavendish-square, on or before the 1st July next.

The name and residence of the Breeders of all animals exhibited, when known, should be stated.

Non-Subscribers to pay five shillings for every head or lot of live stock before obtaining a ticket of permission to bring their cattle into the Show-yard.

The same animal cannot be entered for two classes.

The age of animals, in all cases, to be computed from the day of birth.

The sheep exhibited for any of the prizes must not be shorn before the 1st May, nor after the 1st July, 1839.

Persons intending to exhibit Extra Stock must give notice to the Secretary, on or before the 1st July next.

Stock of every description must be in the Show-yard before Eight o'clock on Tuesday morning, 16th July, and will remain in the charge of the Society until four o'clock on Wednesday afternoon.

No animal can be removed during the Show without leave.

Whenever reference is made to weights or measures, it is to be considered that the Imperial weights and measures are alone referred to.

Persons intending to exhibit Implements, Roots, Seeds, &c., must give notice of their intention to the Secretary; and furnish him with a description, on or before the 10th of July; and all such Implements, Roots, Seeds, &c., must be brought to the Show-yard on Monday, 15th July.

Persons wishing to enter into any Sweepstakes should apprize the Secretary of their intention.

FORMS OF CERTIFICATES.

The subjoined Forms of Certificates, adapted to the animals in each class, must be used by the Candidates intending to exhibit Cattle, Horses, Sheep, or Pigs, at the Oxford Meeting in July, 1839; and must be delivered to the Secretary, on or before the 1st July. The Certificates used must be procured from the Secretary, and if by letter, post paid.

CATTLE.

For Bulls in Classes, 1, 2, 3, *and* 4.

I, , of , in the County of , do hereby certify that the Bull to be exhibited by me for the 1st Prize in Class is of the breed, is not more than years and months old, and is my own property.

N.B. The name and residence of the Breeder, if known, should be stated.

For Cows in Milk, in Classes 1, 2, 3, *and* 4.

I, , of , in the County of , do hereby certify that the Cow to be exhibited by me for the 2nd Prize in Class is of the breed, will, on the 17th July, be not more than years and months old, had a live Calf on the day of last, and is my own property.

N.B. The name and residence of the Breeder if known, should be stated.

For in-calf Heifers in Classes 1, 2, 3, *and* 4.

I, , of , in the County of , do hereby certify, that the Heifer to be exhibited by me for the 3rd Prize in Class is of the breed, will, on the 17th July, be not more than years and months old, was bulled before the 10th of May, 1839, has not been bulling since that day, and is my own property.

N.B. The name and residence of the Breeder, if known, should be stated.

The Prizes for in-calf Heifers will not be paid until they have calved.

For Yearling Heifers, in Classes 1, 2, 3, *and* 4.

I, , of , in the County of , do hereby certify, that the Yearling Heifer, to be exhibited by me for the 4th Prize in Class is of the breed, will, on the 17th July, be not more than one year and months old, and is my own property.

N.B. The name and residence of the Breeder, if known, should be stated.

For Bull Calves in Classes 1, 2, 3, *and* 4.

I, , of , in the County of , do hereby certify, that the Bull Calf, to be exhibited by me for the 5th Prize in Class is of the breed, will, on the 17th July, be not more than months old, and is my own property.

N.B. It is desirable that the day of birth, if known, should be stated.

For Cows in Milk, Class 5.

I, , of , in the County of , do hereby certify that the Cow to be exhibited by me for the Prize in Class 5, will, on the 17th July, be not more than years and months old, had a Calf on the day of last, and is my own property.

N.B. The name and residence of the Breeder, if known, should be stated.

For Oxen in Class 6.

I, , of , in the County of , do hereby certify, that I bought the five Oxen, to be exhibited by me for the Prize in Class 6, of Mr. , at , in the County of , in the month of 1838, and that they are my own property.

N.B. The name and residence of the Breeder, if known, should be stated.

HORSES IN CLASS 7.

For a Cart Stallion.

I, , of , in the County of , do hereby certify that the Cart Stallion to be exhibited by me for the 1st Prize in Class 7, is not more than years old, and is my own property.

For a Cart-Mare and Foal, in Class 7.

I, of , in the County of , do hereby certify, that the Cart Mare and Foal, to be exhibited by me for the 2nd Prize in Class 7, is my own property, and that the Foal is the offspring of the Mare.

N.B. The name of the person to whom the Sire of the Foal belonged should be stated, if known.

For Stallions for Breeding Hunters, &c., in Class 7.

I, , of , in the County of , do hereby certify, that the Stallion, to be exhibited by me for the 3rd Prize in Class 7, has served Mares in the County of , during the season of 1839, at a price not exceeding 3*l.* for each Mare, is not more than years old, and is my own property.

SHEEP.

For Shearling Rams, in Classes 8, 9, *and* 10.

I, , of , in the County of , do hereby certify, that the Shearling Ram, to be exhibited by me for the 1st Prize in Class , is of the breed, was not shorn before the 1st May, nor after the 1st July, 1839, and is my own property.

For Rams of any age, in Classes 8, 9, *and* 10.

I, , of , in the County of , do hereby certify that the Ram to be exhibited by me for the 2nd Prize in Class , is of the breed, will, on the 17th July, be not more than years old, was not shorn before the 1st May, nor after the 1st June, 1839, and is my own property.

For Ewes with their Lambs, in Classes 8, 9, *and* 10.

I, , of , in the County of , do hereby certify, that the Pen of 5 Ewes, with their Lambs, to be exhibited by me for the 3rd Prize in Class , are of the breed, and all of the same flock, that they were not shorn before the 1st May, nor after the 1st July, 1839, that the Lambs are the offspring of the Ewes respectively, and are my own property.

It is desirable that the flock from which they are obtained should be stated if known.

For Shearling Ewes, in Classes 8 *and* 9.

I, , of , in the County of , do hereby certify, that the Pen of 5 Shearling Ewes, to be exhibited by me for the 4th Prize in Class , are of the breed, all of the same flock, were not shorn before the 1st May, nor after the 1st July, 1839, and are my own property.

FOR PIGS IN CLASS 11.

For a Boar.

I, , of , in the County of , do hereby certify, that the Boar, to be exhibited by me for the 1st Prize in Class 11, is my own property.

For a Sow.

I, , of , in the County of , do hereby certify, that the Sow, to be exhibited by me for the 2nd Prize in Class 11, is my own property.

For a Pen of 3 *Pigs.*

I, , of , in the County of , do hereby certify, that the 3 Pigs, to be exhibited by me for the 3rd Prize in Class 11, are all of one litter, will, on the 17th July, be not more than weeks old, and are my own property.

SEED-WHEAT CERTIFICATE.

I, of , in the county of , do hereby certify, that the 12 bushels of Wheat, to be exhibited by me, were grown in the year 1838, on a soil, on the farm of , at , in the County of . The seed of which was obtained from Mr. , and was called

N.B. It would be desirable that any other particulars as to the preceding crop, the manner of sowing, and the quantity and sort of manure used, should be stated. This Certificate must be sent to the Society on or before the 10th of July.

The following declaration, in the hand-writing of the Exhibitor, must be added at the foot of each Certificate:—

I believe the contents of this Certificate to be true. A—— B——

SWEEPSTAKES.

The following Sweepstakes are open to be decided at the Annual Meeting of The English Agricultural Society at Oxford, by the Judges appointed to decide on the Stock shown for the Prizes offered; all the Stakes to close on the 24th June. The ages of the animals to be computed to the day of showing. The Stakes to be paid to the Secretary, on or before the 24th of June.

Any persons wishing to have their names added as subscribers to any one of the Stakes, or to open a fresh one for any kind of stock, will please to give notice to the Secretary.

For the five best Ram Lambs, under seven months old, fed on hay and green food only .	Two Sovereigns each.
For the best two Fleeces of Teg Wool, shorn from Shearling Ewes, which have been folded constantly, and the property of a tenant . .	Two Sovereigns each.
For the best Shearling Leicester Ram . . .	Three Sovereigns each.
For the two best Fat Sheep, not being rams .	Three Sovereigns each.
For the best Short-wool led Shearling Ram .	Ten Sovereigns each.
For the best five Short-wool led Maiden Ewes .	Ten Sovereigns each.

N.B. The fleeces of the sheep exhibited for the two last-named Sweepstakes must be produced, and, if required, certified as belonging to the sheep exhibited; and the Judges will be requested to take into consideration the value of the fleece, as forming part of the value of the animal. Cross-bred sheep are admissible.

For the best Devon Bull . . . . Ten Sovereigns each.

For the best Boar . . . . Ten Sovereigns each.

In the four last-named Sweepstakes size not to be considered conclusive of merit.

For an Ox, under five years old, fed on hay and green food only, previous to Christmas, 1838. Five Sovereigns each.

For an Ox, under four years old, fed on hay and green food only, previous to Christmas, 1838. Five Sovereigns each.

N.B. A statement of the age and manner of feeding the oxen, in the two preceding Sweepstakes, to be given to the Secretary at the time of delivering the other certificates.

A Sale by Auction, of Horses, Beasts, and Sheep, will take place on the day after the Show.

Arrangements will be made for an Agricultural Dinner, on an extensive scale, on the 17th July, the day of the Show.

DONATIONS OF BOOKS.

Titles of Books.	*Donors.*
Practical Farming and Grazing, by C. Hillyard, Esq. 12mo. Northampton, 1837.	C. Hillyard, Esq.
Letter on the formation of a National Agricultural Institution. 8vo. By Henry Handley, Esq., M.P. . .	H. Handley, Esq., M.P.
Thoughts on Improving Agriculture . . .	Mr. Hawkins.
British Husbandry, published by the Society for the Diffusion of Useful Knowledge. 2 vols. 8vo. . . . The Farmer's Annual Account Book. 4to. 1838. . ———— Manual	French Burke, Esq.
———— Magazine, 9 vols. 8vo. Edited by Wm. Shaw Stable Economy, by John Stewart. 12mo. Glasgow, 1838. Elements of Practical Agriculture, by Professor Low. 8vo. Edinburgh, 1838 . . . . . . Advice to Purchasers of Horses, by J. Stewart. 12mo. Glasgow, 1837 . . . . Veterinary Tablet, by Matthew Small. 12mo . .	Wm. Shaw, Esq.
The Veterinarian. 10 vols. 8vo. Edited by W. Youatt, Esq. The Horse, The Sheep, British Cattle: 3 vols. 8vo. Published by the Society for the Diffusion of Useful Knowledge . .	Wm. Youatt, Esq.
The Hop Farmer, by E. I. Lance. 12mo.. . .	Mr. Lance.
The Scriptural Code of Health, by C. Whitlaw. 12mo. 1838	Mr. C. Whitlaw.
Principles of Agriculture, by W. Bland. 12mo. 1827 . .	W. Bland, Jun.
Essay on the Uses of Salt for Agricultural Purposes. By C. W. Johnson, Esq. 8vo. . . . . —— on Liquid Manure. By C. W. Johnson, Esq. 8vo. —— on the Use of Crushed Bones for Manure. By C. W. Johnson, Esq. 8vo. . . . . —— on the Advantages of Railways to Agriculture. By G. W. Johnson, Esq. 8vo. . . . . History of English Gardening, 8vo. By G. W. Johnson, Esq. London, 1829 . . . . Observations on the Employment of Salt in Agriculture, &c. London. 8vo. By C. W. Johnson. . .	C. W. Johnson, Esq.
Lectures on Agricultural Chemistry, by Sir H. Davy. 8vo.	The Duke of Richmond.
Agriculture of England, Wales, and Scotland, communicated to the Board of Agriculture. 8 vols. 4to. . .	Rev. W. L. Rham.

Titles of Books.	*Donors.*
Communications to the Board of Agriculture. 7 vols. 8vo. Ditto, New Series, part I. vol. 1. . . . . Lords' Report on the Corn Laws. 1813–14. . . Commons' Report on the Corn Laws. 1814. . . Surveys of the following counties:— Middlesex—Devonshire—Leicester and Rutland—Bedfordshire—Sussex—East Riding of Yorkshire—Kent—Berkshire—Gloucestershire—Banffshire—Stirlingshire — Dumfriesshire—Renfrewshire—Invernesshire Sutherland—Isle of Man	John Hall, Esq.
Bulletin de la Classe D'Agriculture de la Société des Arts de Geneve. 118 Numbers, to June, 1838. Geneva .	M. Fazey, President of the Agricultural Society at Geneva.
Observations Pratiques, sur la Culture du Pin Maritime dans le Département de la Sarthe. Par Marcellin Vétillart	Marcellin Vetillart.
De la Stabulation Permanente. Par J. C. Favre D'Evires. Lyon, 1834 . . . . Annales de Sciences Physiques et Naturelles D'Agriculture et D'Industrie; publiées par La Société Royale D'Agriculture, etc. de Lyon. Lyon. Tome 1 . . .	La Societe Royale D'Agriculture, etc. de Lyon.
The Agriculturalist's Manual. 8vo. By Peter Lawson and Son. Edinburgh, 1836	C. Lawson, Esq.
Report of the Committee of the Doncaster Agricultural Association on the "Turnip Fly." 8vo. 1834 . . Report of the Committee of the Doncaster Agricultural Association on "Bone Manure." 8vo. 1834 .	J. W. Childers, Esq., M.P.

LIST OF GOVERNORS.

[Life Governors are distinguished by a mark thus. †]

Names.	Town Residence.	Country Residence.
†Acland, Sir T. D. Bart., M.P.	10, Upp Harley-st.	Killerton, Devon.
Adeane, H. John	. .	Babraham House, Cambridge.
Alston, Rowland, M.P. . .	48, Harley-street .	Pishiobury, Sawbridgeworth.
Alston, R. Gardiner . . .	Ditto	Ditto, ditto.
Amherst, Earl	66, Grosvenor-st. .	Montreal, Seven Oaks, Kent.
†Angerstein, John	23, St. James's-sq.	Weeting Hall, Norfolk.
Antrobus, Sir E., Bart. . .	146, Piccadilly . .	Amesbury Abbey, Salisbury.
†Arcedeckne, E.	1, Grosvenor-sq .	Glevering Hall, Suffolk.
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Baker, T. J. Lloyd . . .	. .	Hardwicke Court, Gloucester.
†Barclay, Charles	43, Grosvenor-pl. .	Bury Hill, Dorking, Surrey.
†Barclay, David	8 Belgrave-square	
†Baring Hon. W. B., M.P . .	12, Gt. Stanhope-st.	
Baring, Sir Thos., Bart. . .	21, Devonshire-pl.	Stratton Park, Winchester.
Barker, Thos. Raymond . .	. .	Hambleden, Henley-on-Th.
†Barker, John Raymond . .	. .	Fairford Park, Glostershire.
†Barneby, John, M.P. . . .	38, St. James's-pl.	Brockhampton Hse, Bromyard
Bedford, The Duke of. . .	6, Belgrave-square.	Woburn, Beds.
Benett, John, M.P. . . .	Limmer's Hotel	Pyt House, Hindon, Wilts.
Bevell, J.	. .	
Bisshopp, James	. .	West Burton, Arundel
Blachford, Fitz Roy . . .	. .	Osborn, Cowes, Isle of Wight.
Blake, William	62, Portland-place	Danesbury, Welwyn, Herts.
†Blanshard, Henry . . .	37, Gt. Ormond-st.	Kirby, nr Soken, Essex
Blount, William	12, Cumberland-st.	
Bonsor, Joseph	. .	Pollesden, Surrey.
†Bowes, J., M.P	26, Charles-street .	Streatham Castle, Durham.
Bramston, T. W., M.P. . .	11, Hereford-street	Skreens, Chelmsford, Essex.
Braybrooke, Lord	10, NwBurlingtn-st	Audley-End, Essex.
Bridport, Lord	12, Wimpole-st. .	Cricket Lodge, Chard, Som.
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Buller, T. Wentworth. . .	37, Bryanston-sq .	
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Burrell, Sir C. M., Bart., M.P.	5, Richmond-ter. .	Knepp Castle, Horsham, Sus.
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Challoner, Colonel . . .	29, Portman-square	Portnall Park, Virginia Water

Names.	Town Residence.	Country Residence.
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†Childers, J. W., M.P. . .	40, Eaton-place .	Cantley Hall, Doncaster
†Christopher, R. A., M.P. . .	97, Eaton-square .	Bloxham Hall, Sleaford, Linc
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Clifford, Hon. Charles T. .	Ibbitson's Hotel	Irmham Hall, Cottersworth
†Clive, Hon. R., M.P. . . .	53, Grosvenor-st. .	Oakley Park, Ludlow, Salop
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†Copeland, Alderman, M.P. .	37, Linc.-inn-fields	Lee House, Littlebury, Essex
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Crawley, Samuel, M.P. . .	59, Portland-place	Stockwood, Luton, Bedsh.
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Curtis, W.		
Dacre, Lord	2, Chesterfield-st.	The Hoo, nr Welyn, Herts.
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Drummond, A. M. . . .	Charing Cross .	
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Grafton, The Duke of . .	47, Clarges-street .	Euston Hall, Thetford, Norfolk
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Hewett, W H.		
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†Hulse, Lieut. Col.	Ditto	Ditto, ditto
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†Huntingtower, Lord	. .	Buckminster, Leicester
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†Lefevre, C. Shaw, M.P.	35, Eaton-place	Heckfield, Hartford Bridge
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Maitland, E. Fuller, F.R.S.	3, Bryanstone-sq.	Henley-on-Thames
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†Radnor, Earl of	52, Lwr Grosvr-st.	Longford Castle, Salisbury
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†Richmond, Duke of	51, Portland-place	Goodwood, Sussex
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Roseberry, Earl of	139, Piccadilly .	Warrenwood, Hertford
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†Sanford, E. A., M.P., F.R.S. .	21,Queen-st.Mayfr	Mynehead Court, Somerset
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Sherborne, Lord	13, Hyde Park-st.	Sherborne, Northleach
Sheridan, R. B.	9, Grosvenor-sq. .	Frampton House, Dorchester
Shuckburgh, Sir F., Bart. FRS	Pavilion, Hans-pl.	Shuckburgh House, Warwick.
Slaney, R. A., M.P.	University Club	Walford Manor, Shrewsbury
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Smith, Jeremiah	. .	Cadbar, Rye, Sussex
†Smith, J. Abel, M.P. . .	47, Belgrave-sq. .	Woodhall Park, Ware, Herts
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†Spencer, Earl	27, St. James's-pl.	Althorp, Northampton
Stanhope, John Spencer . .	. .	Cannon Hall, Barnsley
†Stanley, Lord, M.P.	8, St. James's-sq.	Balley Kistern, Tipperary
Stansfield, W. R. C., M.P. .	11, Clarges-street.	Esholt Hall, Bradford
Steel, Sir R.	. .	
Stonor, Thomas	. . .	Stonor, Oxon
Stracy, Sir Edward, Bart. FRS	. .	Rackeath Hall, Norwich
†Stradbroke, Earl of	18, Queen-st.	Henham Hall, Wangford

Names.	Town Residence.	Country Residence.
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Sumner, Colonel Holme, F.RS	. .	Hatchlands, Guildford
†Sutton, Sir Richard, Bart. .	. .	Norwood Park, Wilts
†Sutherland, Duke of . . .	Stable Yard . .	Trentham, Staffordshire
†Talbot, Earl	. .	Ingestrie Hall, ditto
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†Thompson, P. Beilby . . .	29, Berkeley-sq. .	Escrick Park, Yorkshire
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†Townley, R. G., M.P. . . .	Limmer's Hotel .	Fulbourn, Cambridge
Trotter, John	. .	Horton, near Epsom
Vansittart, Henry	. .	Kirkleatham, Gainsbro' Yorks.
Vavasour, Sir E., Bart. . .	. .	Haslewood, Yorkshire
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†Whitbread, W.	76, Eaton-square .	South Hill, Bedfordshire
Wilbraham, G., M.P., F.R.S.	23, Brook-street .	Delamere House, Norwich
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Wilmot, E. W.	. .	Rufford, Ollerton, Notts.
Wills, B.	. .	Camberwell
†Wilson, Henry	. .	Stowlangtoft Hall, Suffolk
Wilshere, —	. .	
Wingate, W. B.	. .	Hareby, Bolingbroke, Lincsh.
†Worsley, Lord, M.P. . . .	12, Up. Belgrave-st.	Manby Hall, Brigg
Wright, John	6, Henrietta-street	Bellsise Park, Hampstead
†Yarborough, Earl of . . .	17, Arlington-st. .	Brocklesby, Brigg
Youatt, William	11, Adams'-terrace, Camden Town	

LIST OF MEMBERS.

[Life Members are distinguished by a mark thus †.]

Names.	Town Residence.	Country Residence.
Abbott, Thomas	. .	Aylesford, Maidstone, Kent
Acland, T. D., M.P.	92, Jermyn-street	Holnicote, Minehead, Somerset
Adey, Rev. John	. .	Wensley Rectory, Bedale
Ade, W.	. .	Chorley, Lichfield, Staffs
Agar, Hon. G. C. F.R.S.	. .	Woodstock, Oxon
Aitken —	. .	Deeping Fen, Spalding, Linc.
Aldworth, W., Jun.	. .	Frilford, Abingdon
Allen, John	. .	Liskeard, Cornwall
Allen, W.	. .	Great Hendred, Wantage
Allix, Charles	. .	Willoughby, Lincolnshire
Allpress, R. W.	. .	Burleigh Hill, St. Ives, Hants
Almack, John, Jun.	10, Whitehall-pl.	Leckonfield Park, Yorkshire
Almack, Thomas	Do.	Bishop Burton, Beverley
Almack, Barugh	Do.	
Ambrose —	. .	
Anderson, Robert	. .	Cirencester
Anderson, W.	. .	Oakley, Beds
Andrews, Edwin	. .	Shroton, Devonshire
Arbuthnot, Rt. Hon. Charles	. .	Woodford Lodge, Frapstone
Arnot, David Gale	. .	Wyfold Court, Henley
Ashurst, W. Henry	. .	Waterstock, Oxon
Astbury, W.	62, High-street, Camden Town	
Astley, Sir Jacob, Bart.	7, Cavendish-sq.	Melton Constable, Dereham,
Badcock, John.	. .	Radley, Abingdon
Badcock, Benjamin	. .	Broad-street, Oxford
Badham, G., D.	. .	Waldring-field, Woodbridge
Bailie, W. H.	33, Cavendish-sq.	
Bailey, C.	. .	Abingdon, Berks
Bailward, John	. .	Horsington, Wincanton,
Baines, John	8, Cleveland-row	Goosnargh, Preston, Lancshre.
Baker, Robert	. .	Writtle, Essex
Baker, Richard W.	. .	Cottesmore, Rutlandshire
Banger, Thomas	. .	Puddletown, Dorset
Barber, R.	. .	Charlton, Tetbury, Glstrshre.
Barclay, J. P.	. .	Haseley, Warwickshire
Barclay, Wm.	. .	St. Caseley, Warwickshire
Barker, George R.	. .	Fairford Park, Glostershire
Barnard, R.	. .	Pusey Farringdon, Berks
Barnett, Charles	. .	Stratton Park, Biggleswade
Barrington, Viscount, M. P.	20, Cavendish-sq.	Beckett House, Farringdon,
Bates, Thomas	. .	Kirkleavington, Yarm,
Bathurst, Earl	38, Charles-street	Oakley Park, Cirencester
Baxter, Robert	. .	Doncaster
Beach, Sir M. H., Bart.	20, Portman-sq.	Williamstrip Park, Fairford,

Names.	Town Residence.	Country Residence.
Beach, H.	. .	Oakley Hall, Basingstoke
Beach, John	. .	Redmarley, Glostershire
Beadel, James	. .	Witham, Essex
Beasley, John	. .	Brampton, near Northampton
Beaufort, Henry	. .	Holme, Biggleswade
Beaumont, E. B.	. .	Firmingby, Bawtry
Bedford, John	. .	Boughton House, Lnclnshire.
Bemon, R.	. .	Donnington, Stow
Bennett, James	. .	Cadbury House, Castle Cary
Bennett, Thomas	. .	Woburn, Beds
Bennett, Samuel	. .	Bickering Park, Woburn
Bennett, William	. .	Lewsey, Luton, Beds.
Bennett —	. .	Chax Hill, Newnham
†Benson, Rev. H. B.	. .	Utterby House, Louth
Bethune, Edward	80, Chester-square	
Bicheno, J. E., F.R.S.	. .	Ty Maen Pyle, Glamorganshire
Bigg, Thomas	15, Crawford-st.	
Birks, John	. .	Herring-field
Blackbourn, David	. .	Temple Brewer, Lincolnshire
†Blair, John	18, Calthorpe-st.	Moseley Lodge, Welford
Bland, Dr.	. .	Grantham, Lincolnshire
Bland, W.	. .	Hartley, Sittingburn, Kent
Blandford, Marquis of	24, Park-lane	Howbury, Beds.
Blandy, J.	. .	Kingston, Bagpuze, Berks
Blexam W.	. .	Modetenham
Boards, W.	. .	Edmonton, Middlesex
Bolton, Lord	Thomas's Hotel	Stockwood Park, Basingstoke
†Bourchier, Charles	66, Wimpole-street	
Bourne, George	. .	Halton, Spilsby, Lincolnshire
Bouverie, Edward	. .	Delapree Abbey, Northamptn.
Bowley, E.	. .	Cirencester
Boys, Henry	. .	Waldershaw, Dover
Boys, R.,	. .	East Bourne
Bradley, Edward	. .	Tradiff Cowbridge
Breynton, John	. .	Haunch Hall, Lichfield
Bristow, S. E.	. .	Burthorpe House, Newark
Bromley, R. M.	Admiralty, Somerset House	Meopham, Kent
Bromwell, Rev. R.	. .	Pembroke College, Oxford
Brookes, J.	. .	Hatford, Faringdon, Berks
Brown, Francis	. .	Welbourne, Lincolnshire
Browne, W. R.	. .	Chilton
Bubb, Anthony	. .	Witcombe, Glostershire
Buckley, John	. .	Normanton Hill, Loughboro.
Budd, Captain H., R. N.	. .	Winterburne Basset, Marlbro'
Bulwer, W. Lytton		Heydon Hall, Norfolk
Burder, D.	. .	Abingdon, Berks
Burn, Ilderton	21, Connaught-sq.	
Burnand, W.	. .	Norton, Chichester
Burgess, Robert	. .	Winterburne
Burke, French	84, Gower-street	
Burt, Thomas	. .	Iwerne
Burt, William	. .	Wilchampton
Burtt, James	. .	Clenston
Bury, J. W.	20, Devonshire-st.	
Butcher, W.	. .	Standish, Gloster

Names.	Town Residence.	Country Residence.
Cadle, Joseph		Westbury-on-Severn, Glosters.
†Calcraft, I. H., M. P.	12, Carlton-terrace	Corfe Castle, Dorset
†Caldecott, Thomas		Rugby Lodge, Rugby
Caldecote, R. M.		Eastbourne
Calthorp, Richard		Swinehead Abbey, Boston
Calverley, T.	1, Regent-street	
Calvert, J. W.	11, Blandford-pl.	
Calvert, Frederick	6, St.James's-place	
Carrington, Geo., Jun.		Missenden, Bucks
Capper, Mrs.		Hailsham House, Sussex
†Carew, W. H. Pole		Antony House, Devonport
Carnegie, Rev. John		Seaford, Sussex
Carter, J. R.		Spalding, Lincolnshire
Cartwright, T. W.		Ragnal Hall, Tuxford, Nots.
Catlin, Thos. W.		Chilesford, Suffolk
†Cator, Rev. Thos.		Skelbrooke Park, Doncaster
Caudwell, W.		Drayton, Abingdon
Cayley, E. S., M.P.	12, Great Rider-st.	Wydale, Malton, Yorkshire
Chamberlain, H.		Desford, Leicestershire
Chapman, T.	Arundel-st., Strand	
Chapman, G.	Do.	
Chapman, Thomas		Stonley, Coventry
Charge, Thomas		Barton, Richmond, Yorkshire
Charlton, J.		
Chawner, R. C.		Wall, Lichfield, Staffs
†Cholmeley, Sir M. J., Bart.		Easton, Lincolnshire
Christie, Langham	2, Cumberland-pl.	Preston Deanery
†Chrystie, William	20,Chester Terrace	
Chute, W. W.		Pakenham Hall, Norfolk
Clarke, Rev. C.		Hansted, Suffolk
Clarke, Thos. E.		Chard, Somerset
Clarke, C. I.		Egham, Surrey
Clayden, John		Littlebury, Essex
Clements, Viscount, M.P.	2, Grosvenor-sq.	Rym, Mohill
Clinch, J. W.		Witney, Oxon
Clode, W.		Bakeham House, Egham
Clutton, Robert		Hartswood, Reigate, Surrey
Clutton, John	8, Parliament-st.	
Coleman, Professor, F.R.S.	Veterinary College	
Collingwood, J. W.		Abingdon, Bucks
†Compton, H. C., M.P.	16, Carlton Terrace	Manor House, Lyndhurst,
Connop, H., Jun.		
Cook, John		Down Ampney, Cirencester
Cooke, Layton	12, Pall Mall	
Cooper, J. G.		Blyborough, Suffolk
Cooper, Thomas		Norton, Seaford, Sussex
Copeland, J.		Abingdon, Berks
Copeland, W.		Abingdon, Berks.
Cormack, W.	Covent Garden	
Cormack, W. J.	Do.	
Cornish, Rev. J. J.		Kenwyn, Cornwall
Corrance, Frederick		Loudham Park, Woodbridge
Cottam, George	Winsley-street	
Cotterell, Sir J. G., Bart.		Garnons, Herefordshire
Courtney, W.		Newton Stacey, Andover
Cowling, C.		Rye Farm, nr Abingdon
Coyney, W. Hill		Weston Coyney, Staffs

Names.	Town Residence.	Country Residence.
Craddock, Sheldon	. .	Hartsworth, Richmond
Cramp, John	. .	Garlinge, Margate
Cramp, J. M.	. .	St.Peters, Isle of Thanet, Kent
Cripps, Jos., M.P.	. .	Cirencester
Cripps, E.	. .	Do.
Crisp, Thomas	. .	Gedgrave, Suffolk
Croft, Sir John, Bart.	Coulson's Hotel	Cowling Hall, Yorkshire
Cross, W. J.	. .	
Crouch, A. W.	. .	Ridgmont, Woburn, Beds
Crowdy, R.	. .	Farringdon, Bucks
Cubley, Samuel	. .	Quarrington, Lincolnshire
†Cure, Capel	2, Devonshire-pl.	Blake Hall, nr. Ongar, Essex
Davenport, G.	. .	Oxford
Davey, G.	. .	Dorchester
David, Evan	. .	Rhadyr Court, Cardiff
Davies, D. S.	. .	
Davis, W.	202, Strand	
†Davis, Samuel	. .	Swerford Park, Banbury
†Davis, R.	9, St. Helen's Place	Skeynes, Eden bridge, Kent
Dawson, E. E.	. .	Ingthorpe, Stamford
Dawson, Edward	. .	Aldcliffe Hall, Lancaster
Dean, James	. .	The Yews, Tottenham
Deane, Ralph	23, Bentinck-street	Escourt House, Reading, Brks.
Dewe, T.	. .	Longworth, Abingdon
†Denbigh, Earl of	18, Eaton-place	Newnham Paddock's
Dennis, Robert	. .	Greetham, Horncastle
Denton, Thomas	. .	Lew, nr Witney
De Visme, Rev. James	. .	Bath
†Dewing, R.	. .	Carbrooke, Norfolk
Dilke, Captain, R.N.	. .	Maxstoke Castle, Coleshill
Divett, E., M.P.	. .	Bystock, Exmouth
Dixon, R. W.	. .	Wickham Bishops, Essex
Dolphin, J.	. .	Mayfield, Sussex
Doughty, F. G.	. .	Martlesham, nr. Woodbridge
†Drax, I. S. W. S. E.	. .	Charborough Park, Blandford
Druce, Samuel		Ensham, Oxon
†Drummond, A. R.	2, Bryanstone-sq.	Cadland, Southampton
Drury, George	. .	Eastbourne, Sussex
Duckworth, John	. .	Barnet, Herts
Duffield, Christopher	. .	Grantham, Lincolnshire
Duke, W. E.	. .	East Lavant, Chichester
Dunning, Ralph	. .	Bishop Burton, Beverley
Dyer, George	. .	East Tisted, Alton, Hants
Dyke, Rev. H. S.	. .	Plynt, Cornwall
Dymoke, The Hon. Champ.	. .	Scrivelsby Court, Horncastle
Edmonds, W.	. .	Kelmscot, nr Burford
Edwardes, Hon. W.	. .	Edmondthorpe, Oakham
Edwards, Hon. Geo.	. .	Noyall Llanarth Aberayron
Edwards, Henry	. .	Barnham, Suffolk
†Elliot, John	. .	Chapel Brompton, Northmpt.
Ellman, John	. .	Glynde, Lewes, Sussex
Ellman, Thomas	. .	Beddingham, do.
Ellman, R. H.	. .	Glynde, Lewes, do.

Names.	Town Residence.	Country Residence.
Elwood, Lieut. Col. C. W.	. .	Clayton Priory, do.
Ensworth, T.	. .	Oxford
Enys, John S.	. .	Penryn, Cornwall
Evans, W.	. .	Hackney
Eve, Richard	. .	Silsoe, Beds
Ewen, Thos. L'Estrange	. .	Dedham, Essex
Eyston, Charles	. .	Hendred House, Abingdon
Farrow, W.	. .	Market Rasen, Lincolnshire
Faulkner, Wm.	. .	Burford
Ferard, Joseph	8 Figtree-ct Temple	
Fiennes, Hon. T. T.	Albany	
Filliter, George	. .	
Finlayson, Dr.	. .	4, Regent-st, Cheltenham
Fisher, T. R.	. .	Oxford
Flight, Thomas	Islington	
Floyd, Thomas	. .	Frilford, Abingdon
†Floyer, John	. .	Stafford, Dorchester
Footner, W. A.	. .	Romsey, Hants
Forster, John	. .	Newton le Willows, Bedale
Fowlie, Wm.	. .	Red House, Hursley, Winchr.
Ffrance, T. R. Wilson	. .	Rawcliff Hall, Preston
†Franklin, Richard	. .	Clemenstine, Glamorganshire
Franklin, John	. .	Ewelm, Benson, Oxon
Franklin, Edward	. .	Ascott, Tetsworth
Fryer, William	. .	Lytchet, Dorset
Fuge, Robert	. .	Dawlish, Devon
Fulshaw, Richard	. .	Knighton, Leicestershire
Gardner, Rev. C.	. .	East Dean, Sussex
Gedney, John	. .	Reden Hall, Harlston
Gee, Thomas	. .	Barton, Lincolnshire
Gibbon, Alexander	. .	Staunton, Gloucestershire
Gibbs, Thomas	24, Half-moon-st.	Ampthill, Beds.
Gibbs, William	. .	Alveston Hill, Stratford on Avon
Gibbs, George	26, Down-street	
Giddy, Charles, R.N.	. .	Penzance, Cornwall
Gilbertson, Matthias	. .	Elm Cottage, Egham
Gillett, Joseph A.	. .	Banbury, Oxon
Gillett, W.	. .	Southleigh, Witney
Gillett, Joseph	. .	Little Haseley, Tilsworth
Gilliat, Atkin	. .	Scrofield, Horncastle
Gills, W.	. .	Alveston Heath, Stratford on Avon
Gladwin, Thomas	. .	Marden Pk, Godstone, Surrey
Goddard, H.	. .	Cliff, Wootton Bassett, Wilts
†Godfrey, Edward		West Lodge, Manningtree,
Godwin, John	. .	Durweston, Dorset
Godwin, Richard	. .	
Good, George	. .	Gussage, Dorset
†Goodden, John	. .	Compton House, Sherborne,
Gordlake, T. M.	. .	Wadley House, Farringdon
Goodricke, Sir F., Bart.	4, Cleveland square	Studley Castle, Warwick

Names.	Town Residence.	Country Residence.
†Goring, H. D., M.P.	17, New-street	Hiden, Shoreham, Sussex
Goring, Mrs.	. .	WistonPark, Steyning, Sussex
Goring, Charles	. .	Ditto, ditto
Gorringe, J. P.	. .	Eastbourne, Sussex
Gorringe, Mrs. J. P.	. .	Ditto, ditto
Gough, Frederick	. .	St. Alban's, Herts
Gowing, E.	. .	Eye, Suffolk
Graburn, R. S.	. .	Brauncewell, Sleaford
†Gratwick, W. K.	. .	Ham, Arundel, Sussex
Grace, Rev. H. T.	. .	Javington, Sussex
Graham, Rev. H. G.		
Grantham Stephen	. .	Stoneham, Lewes Sussex
Green, —	. .	
Green, Rev. G. W.	. .	Court Henry, Llandilo
Grey, W. H. C., F.R.I.S.	10, Cumberland-pl. New-road	
†Gregg, Thomas	. .	Cole's Park, Buntingford
Gregory, Arthur F.	. .	Stivichale Hall, Coventry
Gresley, Rev. W.	. .	St. Charles, Litchfield
Griffin, John	. .	Hemel Hampstead, Herts
Grimshaw, W.	. .	Hackney
†Grove, Thomas	. .	Fern, Shaftsbury, Dorset
Gwilt, Rev. D.	. .	Icklingham Hall, Milden
Hack, James	. .	Bowley, Chichester
Haines, Edward	. .	Stratton, Gloucestershire
Hale, Thomas	. .	East Hanney, Abingdon
†Hall, John	. .	Wiseton, Bawtry
Hall, George Webb	. .	Sneed Park, Bristol
Halstead, Thomas	. .	Woodcoat, Cheshire
Hammans, C.	. .	Garford, Abingdon
Hamond, W. P.	123, Mount street	
Hanbury, John	. .	Curborough, Litchfield
Handley, Major	. .	Pointon, Folkingham
Hanmer, Lieutenant-Colonel	. .	Bear Place, Maidenhead,
Harding, Joseph		Maiden Bradley, Wilts
Harris, Robert	. .	Hinton, Abingdon
†Harrison, Richard	. .	Wolverton, nr Stony Stratford
Harvey, R. B.	. .	Harlston
Harvey, R. H.	. .	Sturminster, Newton, Dorset.
Haselfort, R. L.	. .	Boreham, Essex
Hawkesley, Rev. J. W.	. .	Redruth, Cornwall
†Hawkins, Thomas	. .	Assington, Suffolk
Hayne, W.	. .	Woodstock, Oxon
Hayward, Drinkwater	. .	Frocester Court, Stroud
Hayward, J. C.	. .	Quedgely, Gloucestershire
Hayward, Henry	. .	Wattington, Oxford
Hayward, William	. .	ManorHouse,Weston Turville
Heald, Dr.	. .	Spalding, Lincolnshire
Heath, Sergeant	11, Chancery-lane	Anstey Priory, nr Dorking
Henning, James	. .	Wolverton, Dorchester
Hewer, Jasper	. .	Minchinhampton, Glostersh.
Hewitt, Lieut. R.N.	. .	Eastbourne, Sussex
Heygate, Robert	. .	West Haddon, Northampton
†Heywood, Sir Benjamin Bart.	. .	Manchester
Hicks, Benjamin	. .	Handley, Staffs

Names.	Town Residence.	Country Residence.
Hickson, Richard	. .	Hougham, nr Grantham
Hillyard, Clark	. .	Thorpelands, nr Northampton
Hincks, T. C	. .	Breckonbrough, Thirsk
Hinton, William	. .	Daglingworth, Gloucestershire
Hobbs, Wm.	. .	Bocking, Essex
Hobbs, W. Fisher	. .	Marks Hall, Essex
Hobgen, Joseph	. .	Siddlesham, nr Chichester
Hodgkinson, Richard	. .	Morton Grange, Dorchester
Hodson, W.	. .	Ilford, Sussex
Hodson	. .	Falmer Court Farm
Holbeach, William	. .	Farnborough, Warwickshire
Holcombe, Rev. G. F.	. .	Brinkley, nr Newmarket
Holmes, William S.	. .	Norfolk
Hony, Rev. P.	Athenæum Club .	
Horlock, J. W.	. .	The Rooks, Marshfield
Horwood, John	. .	Steam Park, nr Brackley
Hoskins, K., M.P.	90, Sloane street .	Birch House, Ross
House, John	. .	Anderson
House, John, jun.	. .	Quailston
Howard, Charles	. .	14, Monkgate, York
Howard, G.	. .	
Humfrey, J.	. .	Upton, Abingdon
Humfrey, John	. .	Ditto, ditto
Humfrey, William	. .	Boxford, Newbury
Hurst, —	. .	Radmel Farm, Eastbourne
Husband, T., jun.	. .	Stoke, Devonport
Hutt, John	. .	Water Eaton, nr Oxford
Hutton, John	. .	Marske Hall, nr Richmond
Hutton, William	. .	Gate Barton, nr Gainsbro'
Ide, John	. .	West Wittering, Sussex
Inge, Capt.	. .	
Inskip, Thomas	. .	Marston, Beds
Isaacson, John	. .	Clare, Suffolk
Jackson, Hugh	. .	Wisbeach, Isle of Ely
Jarratt, William	. .	Lletai, Glamorganshire
Jellicoe, John	. .	Brighterton
Jemmett, Henry	. .	Burford
Jervis, Sir Raymond	. .	Fair Oak Park, nr Winchester
Jodrell, Sir R. P., Bart.	64, Portland place	Sall Park, Norfolk
Johnston, Sir F., Bart.	. .	Melton Mowbray
Johnstone, John H.	. .	Menston, nr Ledbury
Johnson, Rev. Dr.	. .	Perran, Cornwall
Johnson, C. W.	14, Gray's inn sqre	
Jonas, Samuel	. .	Ickleton, Cambridgeshire
Jones, John	. .	Harrington, nr Spilsby
Jones, Wm.	. .	Sheep House, nr Glo'ster
Kedward, J. D.	. .	
Kendle, C. J.	. .	Fordham, Downham Market
Kendle, James	. .	Weasenham, Rufham
Kersey, James	. .	Talton, nr Cirencester
Kensay, George	. .	Cornbury Park, Witney
Kilby, George	. .	Queenborough
Kilson, Rev. H.	. .	Folkington, Sussex

Names.	Town Residence.	Country Residence.
Kimberley, G.	. .	Trotsworth, Egham
Kimber, Thomas	. .	North Cerney, Glo'stershire
Kimber, Thomas	. .	Tyfield Wick, Abingdon
†Kinder, J.	. .	Sandridge Bay, St. Albans
Kinder, Thomas	. .	ditto ditto
King. J. Bennett	. .	Wotton, Abingdon
Kingsmill, William	Lambeth Palace	Sidmonton Park, Hants
Kinsman, Rev. R. B.	. .	Cornwall
Kirby, John	. .	South Moreton, nr Wellingford
†Knatchbull, William	. .	Babington, Frome, Somerset
†Knight, H. Gally, M.P.	69, Grosvenor-st.	Firbeck Hall, Bawtry, Yorksh.
Langdale, Hon. C., M.P.	31, Jermyn-street.	Houghton Hall, Market-Weighton
Large, Charles	. .	Broadwell, nr Burford
Latham, R. C.	. .	Clifton, Oxon
Law, Rev. R.	. .	Christian Malford, Wilts
Lawson, W. C.	. .	Edinburgh
Lawson, Andrew	. .	Boroughbridge Hall
Le Couteur, Col.	. .	Belle Vue, Jersey
Lediard, Thomas	. .	Cirencester
†Lee, Lee J.,	. .	Delington House, Ilminster
Lemon, Sir C., Bart., M.P., F.R.S.	46, Charles-street	Carclew, Cornwall
Lethbridge, Sir T. B., Bart.	. .	Sandhill Park, Somerset
Lewis, Robert	. .	Stompain
Leifchild, W. G.	Lothbury . . .	Enfield, Middlesex
Littlewood, John	. .	Armthorpe, Doncaster
Livesay, Thomas	. .	Hackney
Lloyd, Cynnic	. .	Pontryfyth, Denbigh
Lloyd, L. F. Lloyd	. .	Ditto Ditto
Lloyd, Llewellyn	. .	Ditto Ditto
Lloyd, Rev. T.	. .	Swayfield, North Walsham
Lock, George	. .	Blandford, Dorset
Lugor, E.	. .	Hengrave, Bury St. Edmonds
Lumbert, R. C.	. .	Burleigh Hill, Reading
Lush, Joseph	. .	Kilmington, Somerset
†Lyon, James	39, Belgrave-sq.	
Mabbott, W. C.	. .	Lewes, Sussex
Macnamara, A.	7 Low. Seymour-st	Langoed Castle, Brecon
†Mainwaring, T.	. .	Gt. Markwell Hall, Wrexham
Maltby, E. H	Paper-bldgs, Temp.	
Manby, Capt. G., F.R.S.	. .	Royal Barracks, Yarmouth
†March, Earl of	19, Stratford-place.	Goodwood, Sussex
Marshall, Capt. Henry	4, Upper Eaton-st.	
Marshall, W., M.P.	41, Up. Grosvenor-st	Patterdale Hall, Carlisle
Marshall, W.	. .	Hurst, nr Brighton, Sussex
Marsham, R.	. .	Merton College, Oxford
Martin, H. B.	. .	Colston Hall, Bingham
Martin, Robert	. .	Asterby, nr Horncastle
Mason, C. A.	. .	Farrinton, nr Ledbury
Massop, John	. .	
Masters, Joseph	. .	Witney
Maton, J.	. .	Collingbourne, nr Pewsey

Names.	Town Residence.	Country Residence.
Matson, Robert	. .	Wingham, Kent
Matthews, Peter	. .	Elkstone, nr Cirencester
Mauleverer, William . . .	. .	Arncliffe Hall, Cleveland Inn
Maxwell, W.	. .	Everingham, Pocklington
May, Charles	. .	Ipswich
Mayne, T. J., F.R.S. . . .	2, Harcourt-bldgs, Temple	Tiffont House, Salisbury
†Metcalfe, C. J., Jun. . . .	. .	Roxton House, St. Neots
Miller, Rev. M. H. . . .	. .	Scarborough, Yorkshire
Millington, Bryan	. .	Asgarby, Sleaford
†Milne, Alexander	Woods & Forests	
Milne, J. L.	. .	Hilgay Lodge, Downham
Milnes, R. M., M.P. . . .	26, Pall Mall .	Frieston, nr Ferry Bridge
Monck —	. .	Coley Park, Reading
Moody, C. A.	. .	Kingsdown, Ilchester
Moor, Edward, F.R.S. . .	. .	Bealings, nr Woodbridge
Moore, Rev. H.	. .	Willingdon, Sussex
Mount, William	. .	Wasing-pl., Newbury, Berks
Mundy, J.	. .	Cullam, nr Abingdon
Muskett, James	. .	Lambsgrey farm Forest of Dean
Muskett, John	. .	Farnham, Bury St. Edmonds
Neale, H. St. John	. .	Ringwood, Hants
Neame, Frederick	. .	Sellinge, nr Faversham
Neve, Thomas	. .	Benenden, Kent
Niblett, D.	. .	Haresfield, Gloucestershire
Nicholson, W. H.	. .	
Nicklin, Richard	. .	Tipton, near Birmingham
Noakes, T.	. .	Warncocks, nr Eastbourne
Norreys, Lord, M.P. . . .	19, Hanover-square	Wytham, Berks
North, Frederick	. .	Rougham, Norfolk
Northeast, Thomas	. .	Tedworth, nr Andover
Noyes, Thomas H.	. .	East Mascals, Lindfield
Oakley, Thomas	. .	Waterend Farm, Sandridge
O'Brien, Stafford	. .	Blatherwycke Park, Stamford
Ogle, Henry	. .	Eastbourne, Sussex
Oliver, William	. .	
†Oliverson, Richard . . .	14, Portland-place	
Oliver, James	. .	Hanford
Osborne, C.	. .	Haling, Ensworth
Overman, C. E.	. .	Burnham Westgate, Norfolk
Overman, T. W.	. .	Maulden, Beds
Overman, W.	. .	Burnham Sutton, Norfolk
Overman, Henry	. .	Weasenham, Norfolk
Pagden	. .	Eastbourne, Sussex
Page, W. Woods	17, Wimpole-street	
Paget, Henry	. .	Birtoll, Leicestershire
Paget, George	. .	Sutton Bonington, Kegworth
Paget, Charles	. .	Ruddington, nr Notts.
Pain, Philip	. .	Boughton House, Kettering
Paicey, Robert	. .	Chedgelow, nr Tetbury
Palmer, G., M.P.	11, King's Arms yd.	Nazing Park, Essex
Park, Rev. W.	. .	Ince Hall, Cheshire
Parker, Admiral Sir H., Bart.	27, Charles-street	Melford Hall, Long Melford
Parker, T., M.P.	9, Conduit-street	Ensham Hall, Oxon

Names.	Town Residence.	Country Residence.
Parker, C. C.	. .	Woodham Mortimer, Essex
Parker, Oxley	. .	Ditto Ditto
Parker, Henry	. .	Fairford, Gloucestershire
Parkes, J. W. H.	. .	Mawbey Gate, Southampton
Parkinson, W. R.	. .	Mushham, near Newark
Parry, G. F.	12, Bruton-street	Duisk Lodge, Ayrshire
Parsons, George	. .	West Lambrook, S. Petherton
Parsons, John	. .	Old Bank, Oxford
Parsons, J. M.	6, Raymond-buildings, Grays Inn	
†Patterson, W. J.	. .	Durnford Lodge, Wimbledon
Payn, William	. .	Kiddwells, Maidenhead
Peacock, John A.	. .	Osbournley, Lincolnshire
†Pell, Sir W. O.	United Service Club	Synell Hall, Northamptonshire
Pell, Edwin	. .	Do. do.
Peppercorn, Henry	. .	Aylesford, nr Maidstone
Percival, Thomas	. .	Cranford, Middlesex
Percival, William	Regents pk Barrks.	
Perkins, Joseph	. .	Laughton, Leicestershire
Perry, G. W.	Fore-street, City	
Peters, J. W.	. .	Bridge, South Petherton
†Philips, J. Burton	10, Park Cresent	
Phillpotts, Rev. T.	. .	Gwennap, Cornwall
Phipps, T. H., Jun.	. .	Leighton House, Westbury
Picken, William	. .	Whitemoor, nr Ollerton
Pickering, Leonard	. .	Wilcot, nr Witney
Pillans, William	. .	NymphsfieldMinchinhampton
Pinney, William, M.P.	30, Berkeley-sq.	The Park, nr Somerton
Pinnex, P.	. .	West Dean, Chichester
Pinnock, Rev. J.	. .	Madron
Pinnock, Rev. H.	. .	Moroah
Pittman, Rev. T.	. .	Eastbourne, Sussex
Platt, J. C.	22, Ludgate-street	
Plestow, C. Berners	10, Lw Berkeley-st	Wattington Hall, Norfolk
Polhill, William	. .	Eyford, Glo'ster
Powell, Alexander	. .	Hurdcott House, Wilts
Powell, W.	. .	Marcham, Abingdon
Punnet, Rev. J.	. .	St. Erth, nr Hale
Purrott, John	. .	Moins Farm, nr St. Albans
Purser, John	. .	Willingdon, nr Bedford
Putland, John	. .	Firle, Sussex
Randall, Richard	. .	Tunbridge Wells
Ransome, James	. .	Ipswich
Ransome, Robert	. .	Ditto
Ransome, J. A.	. .	Yoxford, nr Ipswich
Rason, W.	. .	Eastbourne, Sussex
Ravenhill, John	. .	Warminster, Wilts
Rawden, C. W.	. .	Eastbourne, Sussex
Rawlence, G. C.	. .	Fordingbridge
Reay, John, Jun.	. .	East Dulwich, Surrey
Rham, Rev. W. L.	. .	Winkfield, Bracknell, Berks
Rhodes, J. A.	. .	Horsforth Hall, Leeds
Rice, E. R., M.P.	16, Suffolk-street	Dover, Kent
Richards, James	. .	Dumbleton, Gloucestershire
Richards, Rev. T.	. .	Aberystwyth, Cardiganshire
Ridgway, J.	Piccadilly	

Names.	Town Residence.	Country Residence.
Riddick, William	. .	Cirencester
Rigg, R., F.R.S.	2, Chatham-place	
Roberts, Robert	. .	Ranceby, Lincolnshire
Robins, B.	. .	East Lavant, nr Chichester
Robertson, D.	Austin Friars	
Robinson, T.	. .	Old Bank, Oxford
Robinson, Rev. W. B.	. .	Lithington, Sussex
†Rodd, Rev. Edward, D.D.	. .	Trebartha Hall, Cornwall
Roden, G.	. .	Sutton Madoc, nr Shiffnall
Rogerson, John	. .	Camden Town
Rogerson, Joseph	. .	Camden Town
Rolfe, J.	. .	Beaconsfield, Bucks
Rolls, J. E. W.	. .	nr Monmouth
Ross, Rev. A.	. .	Westwell Vicarage, Maidstone
Round, C. G., M.P.	12, Suffolk-street	Birch Hall, Colchester
Rowland, Richard	. .	Creslow, Bucks
Rowland, William	. .	Water Eaton, nr Oxford
Rusbridger, John	. .	Goodwood, Sussex
†Russell, Lord C., M.P.	6, Belgrave-square	Woburn, Beds
Russell, T. A.	. .	Cheshunt pk, Waltham Cross
Ryde, W. H.	. .	Aylesbury
Sadler, Henry	. .	Lavant, Sussex
Salomons, David	16, Cumberland-st.	Broom Hill, Tonbridge
Salter, T. F.	. .	Great Hallingbury, Essex
Sampson, Benjamin	. .	Tulley Main, nr Truro
Sanald, S.	. .	Great Caureston House
Sargeant, Edward	. .	Stamford, Lincolnshire
†Sarney, Edward	. .	Soundess, Oxford
Satterfield, Joshua	. .	Green Heys, Manchester
†Saunders, T. B.	6, Brompton-square	
Savill, Samuel	. .	Bocking, Essex
Sawbridge, H. B.	. .	East Haddon, Northampton
Scales, John	. .	Hilloughton, Norfolk
Scotson, Samuel	. .	Toxteth Park, Liverpool
Scudamore, Lieut.-Col.	. .	Kentchurch Court, Hereford
Seawell, Henry	. .	Little Bookham, Surrey
Selmes, Samuel	. .	Beckley, Sussex
Sewell, Professor	Royal Veter. Collg.	
Shaw, William	King's road	
Shawe, R. N.	. .	Kesgrave Hall, Woodbridge
†Shawe, R. F.	. .	Brantingham, Hull
Sheepshanks, Archdeacon	. .	Gluvias, Cornwall
Sherborn, G.	. .	Ashford nr Staines, Middlesex
Sherborn, Francis	. .	Bedfont, Middlesex
Sherratt, John	. .	Litchfield, Staffs
Shitler, John	. .	Bradford Farm
Simonds, J. B.	. .	Twickenham, Middlesex
Skirving, W.	. .	15, Queen-square, Walton
Slack, J. Albin	. .	Redbourn House, Hants
Slatter, William	. .	Stratton, nr Cirencester
Smith, Robert	. .	Heath Farm, St. Albans
Smith, Sir J. W., Bart.	. .	Denver House, Blandford
†Smith, J., jun,	. .	Denver House, Blandford
Smith, C. B.	. .	Whaddon, Gloucestershire
Smyth, George	. .	
Smythies, Rev. J. R.	. .	Lynch Park, nr Leominster

Names.	Town Residence.	Country Residence.
Snow, Benjamin	. .	Sleaford, Lincolnshire
Snow, Johnson	. .	Evendon, Lincolnshire
Snowden, Rev. C. C. . . .	. .	Slooe, Sussex
Somes, Samuel	. .	Wollaston, nr Willingboro'
Souhter, George	. .	Box Grove, nr Chichester
Sparkes, William	. .	Crewkerne, Somerset
†Spencer, Hon. Capt., M.P. .	27, St. James'-place	Althorp, Northampton
Spooner, C.	Veterinary College	
Stace —	. .	Berwick, Sussex
Stallard, Joseph	. .	Redmarley, Glostershire
Stannier John	. .	Heaton, nr Shrewsbury
Stanley, Edward	14, Grosvenor-sq. .	
Starling, Robert	14, Norfolk-street	
Starr, John	. .	Eastbourne, Sussex
St. Clair, Capt.	. .	Staverton Court, Glostershire
†Steuart, Robert, M.P. . .	10. Up Belgrave-sq	Alderston, Haddington
Stokes, Charles	. .	Kingston Keyworth, Notts
Stokes, J. Allen	. .	Kervington, nr Evesham
Stokes, John	. .	Pauntley, Gloucestershire
Stone, W.	. .	Streetley House, Reading
Stone, Mark	. .	Tyfield Wick, Berks
Stone, George	. .	Ditto
Strafford, Henry	7, Brecknock-cres.	
Strickland, W.	. .	Oxford
†Stringer, Miles	. .	Effingham Hill
Stroud, Henry	. .	Spetesbury, nr Poole
Sumner, Rev. C. V.	. .	
Sutherland, J. W.	. .	Croydon, Surrey
Swann, James	. .	Ensham, nr Oxford
Tanner, William	. .	Patcham, nr Brighton
Tattersall, J.	46, Lw Belgrave-st	
Taunton, W. P.	. .	Bristol
†Tawney, Henry	. .	Banbury, Oxon
†Tawney, Charles	. .	Oxford
Taylor, Walter	. .	Hockley, nr Alresford
Thackrah, George	. .	Feltham, Middlesex
Thimbleby, William	. .	East Kirby, nr Bolingbroke
Thomas, James	. .	Lidlington, nr Woburn
Thompson, H. S.	. .	Kirby Hall, Boroughbridge
†Thompson, C. P., M.P. . .	13, South Audley-st	
Thomson Guy	. .	Old Bank, Oxford
Thornton, Stephen	. .	Moggesbarges House
Thorold, B. H..	12, Abingdon-st .	Harmonston Hall, nr Lincoln
Throgmorton, R. G.	. .	Buckland, nr Faringdon
Thurston, Capt. C., R.N. . .	. .	Machyulleth
Tilden, John	. .	Ifield Court, Gravesend
Tillyer, James	. .	Harmondsworth, Middlesex
Tillyer, George	. .	Feltham, Middlesex
Tindale, Benjamin	. .	Ewerby, Lincolnshire
Toovey, Henry	. .	Hambleden, Bucks
Toovey, Thomas	. .	Joyce Grove, Oxon
Torr, W. jun.	. .	Riby, nr Caister
Toynbee, G.	. .	Hickington, Lincolnshire
Treby, Henry Hale	. .	Cobham Lodge, Cobham
Trevor, Hon. Gen.	. .	Glynde, nr Lewes, Sussex
Treweeke, Rev. G.	. .	Illogan, Cornwall

Names.	Town Residence.	Country Residence.
Trinder, Daniel	. .	Cirencester
Trumper, James	. .	Southall, Middlesex
Trumper, Wm.	. .	Iver, Bucks
Tuckey, Thomas	. .	Compton Beauchamp
Tuckwell, Humphrey	. .	Signet, nr Burford
Turner, George	. .	Barton Assington, nr Exeter
Turner, C.	. .	Stoke, Grantham
Twynham, Dr.	. .	Lainston House, nr Winchest.
Twynam, J. T.	. .	Whitechurch, Hants
Umbers, Thomas	. .	Wappenbury, Warwickshire
Umbers, W., jun.	. .	Wappenbury, Warwickshire
Uppleby, S.	. .	Wotton Hall, Lincolnshire
Unwin, Stephen, jun.	. .	Coggeshall, Essex
Upton, Henry	. .	Aldwick, nr Bognor
Vaisey, Thomas	. .	Stratton, nr Cirencester
Vaizey, George	. .	Halsted, Essex
†Vane, Rev. J.	. .	Dulwich, Surrey
Vines, R.	13, Great College-st	
†Verney, Sir H. Bart., M.P.	6, St. James's-pl.	Claydon House, Bucks
Villebois, F.	. .	Benham Place, Newbury
Walesby, Prime	. .	Rancby, nr Horncastle
Walker, George	. .	Greenfield Lodge, Strixton
Walker, John	. .	Barton, nr Worcester
Waller, H. S.	. .	Farrington, Northleach
Walpole, William	. .	
Walsh, Sir John, Bart., M.P.	28, Berkeley-square	Warfield House, Berks
Walters, J. W.	. .	Barnwood, Gloucestershire
Warburton, H., M.P., F.R.S.	45, Cadogan-place	
Warry, George	. .	Shapwick, Glastonbury
Ward, H. G., M.P.	2, Cleveland-street	Gilsten Park, Herts
Washbourne T. E.	. .	Speenhamland, Newbury
Washbourne, E. B.	. .	Ditto Ditto
Watson, Henry	. .	Walkeringham, nr Bawtry
Weall, Thomas	. .	Woodcote Lodge, Beadington
Webb, William	3 Arundel-st. Strand	
Webb, Jonas	. .	Babraham, nr Cambridge
Webster, Lady	. .	Battle Abbey, Sussex
Webster, J.	. .	Penns, nr Birmingham
†Weeding, Thomas	47, Mecklenbrg-sq.	
Weeks, Frederick	. .	Hurstpoint, nr Brighton
Welland, Charles	. .	
Wells, Thomas	. .	Hampnett, Northleach
Wells, Fleetwood	. .	Ellsboro', nr Andover
Welstead, Benjamin	. .	Kimbolton, Hants
Welton, Cornelius	. .	
West, John	. .	Miningsby, nr Horncastle
Western, Lord	35, South-street	Felix Hall, Kelvedon, Essex
Westhead, John	. .	Manchester
†Weyland, John, F.R.S.	52, Charles-street	Woodrising Hall, Norfolk
White, Joseph	. .	Anfield, nr Romsey
Whitear, Rev. W.	. .	Harleston, Norfolk

Names.	Town Residence.	Country Residence.
Whittington, G.	13, Size-lane, City	Whitmore House, Ripley
Whitlaw, C.	30, Argyl-street	
Whitting, J. H.	. .	
†Wickens, J. Stephens . . .	35, Mortimer-street	
Wicksted, Charles . . .	. .	Brand, Market Drayton
Wilkinson, Rev. F. . . .	. .	Eastbourne, Sussex
Wilkinson, Capt.	. .	Walsham, Suffolk
Wilkinson, George . . .	. .	Wolverton, Stony Stratford
†Willoughby, H.	. .	
Wilmot, Sir E., Bart., M.P. F.R.S	Athenæum	Berkswell Hall, Warwick
Winder, J. W. Lyon . . .	. .	Horstead House, Norwich
Wingate, Thomas	. .	Owmby, nr Caister
Wither, Rev. L. B. . . .	. .	Manydown Park, Basingstoke
Withers, R.	. .	Gussage, St. Michael
Wodehouse, E., M.P. . . .	Limmer's Hotel	Windham, Norfolk
Wolfe, R. B.	. .	Wood Hall, nr Newport
†Wood, C., M.P.	Admiralty	Ickleton Hall, Doncaster
Wood, George James . . .	. .	Adminster, Dorset
Wood, H.	. .	Bramdean House, Alresford
Wood, John	. .	Heath Farm, Cassiobury
Wood, James	. .	Twineham, Cuckfield
Wood, John	28, Chester-street	Melton, nr Woodbridge
Woods, W. L.	. .	Chilgrove, nr Midhurst
Woodward, William . .	. .	Bredons Morton, Tewkesbury
Woolff, Rev. G.	. .	Gwinear, Cornwall
Worthington, R.	. .	Brockhurst, nr Coventry
†Wratislaw, W. F.	. .	Rugby, Warwickshire
Wyndham, W., Jun. . . .	. .	Dinton, Salisbury
Yeatman, Rev. H. F. . . .	. .	Stool House, Sturminster
Yeld, W. W.	. .	Armitage, Rugeley
Yelloly, John, M.D., F.R.S. .	. .	Woodton Hall, Norfolk
Young, M.	. .	Begbrook, nr Woodstock
Young, Rev. B.	. .	Wartling, Sussex
Zetland, Earl of . . .	19, Arlington-street	Upleatham Hall, Gainsbro'

HONORARY MEMBERS.

Stevenson, A., Esq., United States' Minister.

Weyer, M. Van de, Belgian Minister.

ENGLISH AGRICULTURAL SOCIETY,

1839—1840.

English Agricultural Society,

5, Cavendish Square.

ANNUAL LONDON MEETING,

May 22nd, 1839.

REPORT OF THE COMMITTEE.

It is with much satisfaction that your Committee lay before the Society their First Yearly Report on the general state of our affairs; since, although our efforts for the improvement of English Husbandry are as yet necessarily imperfect, the support which has been received from the public warrants a confident hope that those efforts, if steadily continued on our part, will be duly seconded on theirs, and will meet with final success.

The number of our members consists, on this our first anniversary, of 230 Governors (72 of whom are for life, and 158 by a subscription of 5*l.* yearly), and of 874 ordinary members (64 of whom are for life, and the remaining 810 by subscription): the total being 1104 members of all classes.*

A statement of our finances will be found in the balance-sheet annexed to this Report.

Since our last Report a list of prizes has been published for stock to be shown at the approaching Oxford Meeting. These amount altogether to 740*l.*, besides 50*l.* for extra stock, implements, roots, and seeds, 50*l.* for a draining plough, and two prizes of 50 sovereigns each for the best specimens of white and of red seed-wheat; this last being an object which your Committee regard as of especial importance. It has been already reported

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* On the 4th of September, 1839, the English Agricultural Society consisted of 1838 Subscribers: namely, 2 Honorary Members, 80 Life-Governors, 183 Governors, 90 Life-Members, and 1483 Members.

to the Society, that ten prizes had also been offered for essays to be read before that meeting. On this point, as the award of the judges is not yet known, it can only be stated that there are claimants for all those prizes, and that there is competition for nine. Your Committee cannot leave this subject without adverting to the fact, that the active Local Committee, which has been for some time engaged in making the necessary arrangements for the meeting, has received the most obliging encouragement from the highest authorities both of the University and City of Oxford.

It has been already made known to you that communications have been opened with the agricultural societies of Paris, Lyons, Lille, and Geneva. We have now to add those of Thoulouse and Bordeaux abroad, and the Entomological, Horticultural, and Statistical Societies at home.

It being extremely desirable that, according to the practice of other societies, we should form a Library of reference open to our members, application has been in the first instance made to the Treasury for the use of those books which formerly belonged to the late Board of Agriculture, and the loan of these has been accorded us.

A request has been further addressed to the same quarter, that the Director of the Ordnance Geological Survey, Mr. De La Beche, who, among other objects, is in that capacity collecting specimens of the various soils and subsoils of England, might be permitted to supply the Society with duplicate specimens to be deposited in our Museum, on our undertaking to defray any expense that may be thereby incurred; and to this request, also, a favourable answer has been received.

In accordance, likewise, with the experience and practice of other Societies, having for their object the promotion of any department of knowledge, it has been determined to publish from time to time such communications of facts or such other suggestions, authenticated by the names of the writers, as appear likely to contribute to the progress of husbandry, and the first number of our Journal was accordingly published in April last.

Having thus reported such steps as your Committee have taken in discharge of the trust committed to them by the Society, they are now desirous shortly to advert to some of the heads under which it appears to them that our future labours in the promotion of agricultural knowledge may be conveniently classed. The first of these appears to them to be a more accurate acquaintance with the characteristics of soils, and it might properly be termed the—

I.—Classification of Soils.

It is well known to practical farmers that in fields, where the soil is seemingly throughout of one character, various qualities are found by experience to exist in different portions; that diversity is found, of course, to be greater in larger divisions, such as farms, parishes, and hundreds. Attempts have been made by chemical examination to ascertain and account for these variations, but not as yet with any decided success. It appears, however, that geologists, in making their surveys, often readily distinguish the strata, which they seek to lay down in their maps by the vegetation which appears on the surface, and many facts might be adduced in support of the connexion between the geological and agricultural characters of given districts. It has been proposed, therefore, by the Journal Committee, that a survey should be made of the Weald of Kent and Sussex, as a first step towards bringing this view into a tangible shape, it being obvious that a correct knowledge of the various soils of this country is the only solid foundation of English agricultural science.*

II.—Permanent Improvement of Soils.

The large sums yearly laid out in drainage, and the yet larger amounts which might probably be so expended with advantage, show the necessity of attending carefully to the details of this process, as to the depth, distance, materials of the drains, in different

* A Sub-Committee of Geology has since been appointed, who will have specially to consider the survey here referred to.

soils and inclinations of level. The Deanston process of deep and frequent draining, coupled with subsoil ploughing, appears also to deserve especial attention: soils, too, which are not over wet, may still be found capable of being deepened, as well as of being otherwise improved in their chemical or mechanical character by judicious admixture.

III.—Productiveness of Seeds.

Under this head it is desirable that experiments should be made by individual members on the comparative productiveness of each kind of corn, in amount both of grain and of straw upon different qualities of soil: nor can the result be regarded as complete, unless the goodness of the grain, its power, that is, of yielding flour, be tested, as well as its weight and bulk. It has been even shown by experiment that two samples of flour similar in apparent quality have yielded different proportions of bread. In the same way the productiveness of the varieties of turnip, beet, carrot, potato, &c., should be respectively tested; and the bulk being ascertained, the nutritive properties possessed by equal bulks should be discovered, either by chemical analysis or by actual trial in the feeding of cattle. These roots might also be tried with advantage against each other, as turnips against mangel-wurzel, both as to amount of produce and as to nutritive power, and that too upon the different kinds of stock usually kept.

IV.—Manures.

This, again, is a large subject, complicated by the various conditions of soil, crop, climate, and time under which the various manures may have to be applied. Without attempting, at present, to lay down specific details, it will be sufficient to stimulate the inquiries of our members if we enumerate some of the principal heads:—

I.—Natural or farm-yard manure. 1. Degree of fermentation. 2. Time of application. 3. Mode of application. 4. Compost

heaps. 5. Improvement by superior feeding. 6. Effect on different crops. 7. Liquid manures.

II.—Artificial manures of a similar nature prepared in towns.

III.—Refuse manures, as bones, rape-cake, rags, malt-dust, &c.

IV.—Mineral manures, as lime, chalk, gypsum, marl, saltpetre, peat-ashes, salt, &c.

V.—Rotation of Crops.

Under this head your Committee will only recommend, at present, that endeavours should be made to ascertain the influence, sometimes favourable and in other cases hurtful, which various crops exercise on others by which they are followed, and which is now supposed to be occasioned by an excrementitious deposit left by the roots of plants in the soil. They would also, however, suggest to members the practical advantage which may arise from multiplying and varying their green crops for the regular support of an increased amount of stock throughout the year.

VI.—Stock.

They will equally abstain from going into detail under this head, as to the many important points in which a comparison might be instituted between our different breeds of cattle and sheep. They trust that one direct effect of the Society's exertions will be to bring the best blood of the most improved breeds into districts where these are comparatively unknown. They are disposed to think that many improvements might be made in the management and feeding of stock; and they would particularly recommend to members of the Society the consideration whether they might not advantageously adopt a more active breed of cart-horses than is usually met with in England; and whether also some changes in the mode of feeding them might not produce increased economy, without diminishing the comfort of the animals, or injuring their condition.

VII.—Mechanics of Agriculture.

Under this head great improvements have been effected of late years: some parts of the country, however, are much in advance of others in their adoption, whether as regards the better construction of ancient implements (the plough in particular); the employment of those which have been recently invented (such as the drill, the scarifier, or the turnip-cutter); or, lastly, in the employment of fixed machinery at the homestead, driven by steam, water, or wind. In these, as well as many other improvements of husbandry, the North and West of England have little more acquaintance with the practices of each other than two distinct nations might be supposed to possess. The disposition of farm-buildings may be included under this general head.

VIII.—Diseases of Cattle and Plants.

1.—*Veterinary Art.*

A deputation has been appointed to confer with the heads of the Veterinary College upon this subject.

2.—*Diseases of Plants.*

Little is known at present of the real nature of the diseases to which plants are liable, and still less of any mode of prevention or cure.

IX.—Grass Farms.

The management of these farms, though in some points necessarily connected with the preceding heads, is sufficiently distinct and important to form a separate head for future investigation, especially as little more is known at present than that different pastures have very different effects on the produce and condition of the stock placed upon them. If it be true, as has been asserted, that the Dutch butter, whether fresh or salted, is much better to

keep than our own, it will be well worth while to inquire into the difference of dairy management in Holland and in this country.

X.—Physiology of Agriculture.

This last head would include questions of a more abstract nature; and whereas, under the others, we should have to observe and record matters of fact—as, for instance, that bone-manure is beneficial on certain soils, and inefficient on certain other soils—under this head we should inquire after causes, and endeavour to answer the question, What is the constituent element of bone which promotes vegetation on some soils, and how is that element rendered inoperative elsewhere?

Your Committee having thus adverted to some of the principal heads which appear to them of most immediate interest in the present state of English husbandry, will conclude by expressing their hope that the members of the Society will strengthen its collective endeavours by their own individual efforts on their respective farms and properties; and that a mass of facts and observations may thus gradually be brought together, by the careful comparison of which, new light may be thrown on many of the obscure and doubtful points of Agricultural science.

STATEMENT OF THE RECEIPTS AND EXPENDITURE OF THE ENGLISH AGRICULTURAL SOCIETY,

From the period of its formation, in MAY, 1838, to the 10th MAY, 1839.

RECEIPTS :—	£. s. d.	£.	s.	d.
By Life Governors' Compositions		3397	10	0
Governors' Annual Subscriptions in the year 1838	£605 5 0			
„ 1839	195 0 0			
		800	5	0
By Life Members' Compositions		651	0	0
By Members' Annual Subscriptions in the year 1838	£334 14 0			
„ 1839	233 11 0			
		568	5	0
		£5417	0	0

EXPENDITURE :—	£. s. d.	£.	s.	d.
To the charges of Management:				
For Advertisements	£143 19			
Stationery, Postage, Carriage of Parcels, Books, Maps, &c.	85 5 7			
Printing and Lithography . .	175 16 3			
Salaries to Secretary, &c., to the 12th of May, 1839	245 0 0			
Rent paid to the 12th of May, 1839 .	337 4 0			
Miscellaneous payments for meetings at Freemasons' Tavern, Coals, &c. .	32 15 0			
		1020		2
To Prizes for the amounts distributed to Rev. W. L. Rham . . .	20 0 0			
——— Dudgeon . . .	50 0 0			
		70	0	0
To cost of Furniture, &c.		121	10	4
To permanent investment for purchase in the New $3\frac{1}{2}$ per Cents. :—				
£1970 8 10 Stock cost	2000 0 0			
996 5 3 Ditto ditto	1000 0 0			
£2966 14 1 Stock cost		3000	0	0
To Messrs. Drummond, bankers, for the balance of Cash in their hands		1196	7	9
To Petty Cash for the Balance in the hands of the Secretary		9	1	9
		£5417	0	0

London, 10th May, 1839.

NATH. W. SYMONDS,
Accountant.

OXFORD MEETING.

The Annual Country Meeting of the English Agricultural Society, recently held at Oxford, in the month of July, has fulfilled the expectations of the friends of agricultural improvement; and, in recording a notice in their Journal of the stock and implements exhibited on that occasion, the Committee cannot refrain from congratulating the Society on the successful issue of their first attempt of this kind. The excellent arrangements of the Local Committee, the support of the Mayor and Corporation, and the participation in the whole by the Vice-Chancellor and other leading members of the University, are circumstances which eminently promoted the objects of the Meeting, and the harmony and good understanding of the immense multitude assembled on that occasion; and when it is considered that no less than between two and three thousand individuals—eminent cultivators of the soil, breeders of stock, or friends generally to the advance of husbandry in this kingdom—came from every part of the country to form that Meeting, and were personal inspectors and auditors on subjects connected with the most approved plans of mechanical application, or general modes of management in the various departments of practical farming, the Committee cannot but have a well-grounded assurance of the benefits such an interchange and discussion of opinions must have, not only in bringing farmers into better acquaintance with each other's wants and wishes, but in the removal of those local prejudices which have for so long a period retarded the progress of agricultural improvement in this Country.

The Society have accepted the invitation of the nobility and gentry of the neighbourhood of Cambridge to hold their next

Annual Country Meeting in that city, in July, 1840; and a Committee has been already appointed to hold a conference with some of those gentlemen respecting the arrangements for the occasion.

The Committee feel that many of the minor inconveniences of the first Meeting, arising from the novelty of the undertaking, will no doubt be in a great measure removed or guarded against by the experience already gained, and by their intrusting the management of the business to the same Committee who co-operated with the Local Committee at Oxford.

Exhibition of Stock.

The show of live-stock was numerous, and in most of the classes there were as many superior animals as have often been exhibited together before: there certainly, also, were several of a very inferior description—but this was to be expected. One of the advantages to be derived from an exhibition of this nature is, to show to farmers and breeders of live-stock the perfections in shape and quality at which they ought to aim; and it should, therefore, be no disappointment to the Society to find that some of the exhibitors proved, by the animals which they brought to the show, that they were at present very deficient in this knowledge. It must also be admitted that, if a foreigner had come to Oxford, expecting to see the best show of breeding-stock which England could produce, he would have been led to form a very inadequate idea of the merits of the different sorts of live-stock bred in this country: but the number of excellent animals shown, and the admirable arrangements for showing them which had been made by the Stewards, rendered the exhibition a most interesting and gratifying sight to the thousands who came (some from great distances) to view it.

There would be great difficulty in selecting any individual animals for particular remark: if this were attempted it would be very probable that, from the number exhibited, and from the

unavoidable crowd of spectators, some might be overlooked and omitted in this selection quite equal in merit to those which were noticed. The best guide as to the relative merits of the stock is the decision of the Judges; and, on this occasion, the awards appeared to give more general satisfaction than often is the case at agricultural exhibitions. Some few of the exhibitors were, as might be expected, dissatisfied, but, upon the whole, very little dissatisfaction was expressed; and it appeared in this, as in everything relating to the Meeting, that all who were present were determined to be in good humour.

The prize intended to be given by the Society, in order to ascertain the best and most productive varieties of wheat, cannot be decided. The wheat exhibited was of excellent quality, and the Judges selected, as was intended, two samples of white and two samples of red wheat, of great beauty and purity, for trial; but the desire of the public to examine the different samples shown, and to compare them together, was so great, that not only a great deal of the wheat from the selected parcels was thrown down and lost, but the wheat from all the parcels was mixed together, so that, either as to quantity or to purity, the wheat sown might have been very different from that which was exhibited. The Society, in making their arrangements for the decision of this prize on a future occasion, will take precautions against this accident again occurring.

Award of Premiums.

Class I. (Short-horns).

To Mr. Thomas Bates, of Kirkleavington, near Yarm, Yorkshire: the First Premium of Thirty Sovereigns, for his 3 years and 9 months old Short-horned Bull, bred by himself.

To Mr. Thomas Bates, of Kirkleavington, near Yarm, Yorkshire: the Second Premium of Fifteen Sovereigns, for his 4 years and 8 months old Short-horned Cow, bred by himself.

To Mr. Thomas Bates, of Kirkleavington, near Yarm, Yorkshire: the Third Premium of Fifteen Sovereigns, for his 1 year and 11 months old in-calf Heifer, of the Short-horned breed, bred by himself.

To Mr. Thomas Bates, of Kirkleavington, near Yarm, Yorkshire: the Fourth Premium of Ten Sovereigns, for his 1 year and 10 months old Yearling Heifer of the Short-horned breed, bred by himself.

To The Marquess of Exeter: the Fifth Premium of Ten Sovereigns, for his Lordship's 7 months old Short-horned Bull Calf.

Class II. (Herefords).

To Mr. Thomas Jeffries, Jun., of the Grove, Pembridge, Herefordshire: the First Premium of Thirty Sovereigns, for his 3 years and 10 months old Hereford Bull.

To Mr. James Walker, of North Leach, Gloucestershire: the Second Premium of Fifteen Sovereigns, for his 6 years and 6 months old Hereford Cow.

To Mr. Edward West, of Little Frome, near Bromyard, Herefordshire: the Third Premium of Fifteen Sovereigns, for his 2 years and 7 months old Hereford Heifer, bred by himself.

To Mr. John Hewer, of Hampton Lodge, Hereford: the Fourth Premium of Ten Sovereigns, for his 1 year and 6 months old Yearling Heifer.

To Mr. John Walker, of Burton, near Worcester: the Fifth Premium of Ten Sovereigns, for his 8 months and 2 weeks old Hereford Bull Calf.

Class III. (Devons).

To Mr. Matthew Paull, of Compton-Paunceford, near Wincanton, Somersetshire: the First Premium of Thirty Sovereigns, for his 3 years and 2 months old Devon Bull, bred by the late Mr. W. Davey, of Flitton, North Moulton, Devonshire.

To Mr. J. W. Peters, of South-Petherton, Somerset: the Second Premium of Fifteen Sovereigns, for his 9 years and 6 months old North Devon Cow.

To Mr. Matthew Paull, of Compton-Paunceford, Somerset: the Third Premium of Fifteen Sovereigns, for his 2 years and three months old in-calf Heifer, bred by himself.

To Mr. Matthew Paull, of Compton-Paunceford, Somerset: the Fourth Premium of Ten Sovereigns, for his 1 year and 5 months old Yearling Devon Heifer, bred by himself.

To Mr. Matthew Paull, of Compton-Paunceford, Somerset: the Fifth Premium of Ten Sovereigns, for his 6 months old Devon Bull Calf, bred by himself.

Class IV. (any Breed or Cross, not qualified for the foregoing Classes).

To Mr. Richard Hortin, of Sherbourne, Warwickshire: the First Premium of Thirty Sovereigns, for his 4 years and 2 months old Pure Long-horned Bull.

To Mr. John Putland, of Firle-Place Farm, near Lewes, Sussex: the Second Premium of Fifteen Sovereigns, for his 5 years and 4 months old Pure Sussex Cow.

[No Candidate for the Third Premium of Fifteen Sovereigns, offered for the best in-calf Heifer not exceeding 3 years old, of any breed or cross, not qualified for Classes I., II., and III.]

To Mr. Thomas Stephens, of Whitelackington, near Ilminster, Somersetshire: the Fourth Premium of Ten Sovereigns, for his 1 year and 5 months old Yearling Hereford and Devon Heifer.

To Mr. William Cother, of Middle Aston, near Woodstock, Oxfordshire: the Fifth Premium of Ten Sovereigns, for his 18 weeks old Bull Calf, of the Hereford and Durham breed.

Class V. (Dairy Cattle).

To the Rev. J. R. Smythies, of Lynch Court, near Leominster, Herefordshire: the First Premium of Fifteen Sovereigns, for his 9 years and 6 months old Hereford Cow.

To Mr. Joseph Badcock, of Pyrton, near Tetsworth, Oxfordshire: the Second Premium of Ten Sovereigns, for his 14 years and 2 months old Durham Cow, bred by himself.

Class VI. (Oxen).

To Mr. Richard Rowland, of Creslow, Buckinghamshire: the First Premium of Twenty Sovereigns, for his Five Hereford Oxen.

To Mr. W. Trinder, of Wantage, Berkshire: the Second Premium of Twenty Sovereigns, for his Five North-Devon Oxen, bred by the late Mr. Talbot, of Temple Guiting, Gloucestershire.

Class VII. (Horses).

To Mr. Thomas Freeman, of Henham, near Wangford, Suffolk: the First Premium of Twenty Sovereigns, for the best Cart Stallion.

To Mr. Joseph Osborne, of Chilton, near Thame, Buckinghamshire: the Second Premium of Ten Sovereigns, for the best Cart Mare and Foal.

[The Third Premium of Thirty Sovereigns, for the best Stallion for breeding Hunters, Carriage-horses, or Roadsters, which shall have served mares during the season of 1839, at a price not exceeding 3*l*., was not adjudged.]

Class VIII. (Leicesters).

To Mr. Samuel Bennett, of Bickerings Park, near Woburn, Bedfordshire: the First Premium of Thirty Sovereigns, for the best Pure Leicester Shearling Ram.

To Mr. Thomas Inskip, of Marston, near Ampthill, Bedfordshire: the Second Premium of Ten Sovereigns, for the Second-best Shearling Leicester Ram.

To Mr. John Earl, of Earl's Barton, Northamptonshire: the Second Premium of the Class of Thirty Sovereigns, for his 3 years old Pure Leicester Ram.

To Mr. Richard Archer, of Tachbrook, near Barton, Warwickshire: the Third Premium of Ten Sovereigns, for the best Pen of Five Ewes, with their Lambs.

To Mr. Thomas Umbers, of Wappenbury, near Rugby, Warwickshire: the Fourth Premium of Ten Sovereigns, for the best Pen of Five Shearling Leicester Ewes.

Class IX. (South Downs, or other Short-woolled Sheep).

To Mr. Stephen Grantham, of Stoneham, Sussex: the First Premium of Thirty Sovereigns, for the best Shearling Short-woolled Ram.

To Mr. John Harris, of Hinton, Berkshire: the Premium of Ten Sovereigns, for the Second-best Shearling Short-woolled Ram.

To Mr. Thomas Crisp, of Gedgrave Hall, Orford, Suffolk: the Second Premium of Thirty Sovereigns, for his 2 years old South Down Ram.

To Mr. James Maton, of Collingbourne, near Pewsey, Wiltshire: the Third Premium of Ten Sovereigns, for the best Pen of Five Short-woolled Ewes, with their Lambs.

To Mr. James Maton, of Collingbourne, Wiltshire: the Fourth Premium of Ten Sovereigns, for the best Pen of Five Shearling Ewes.

Class X. (Long-woolled).

To Mr. Charles Large, of Broadwell, near Burford, Oxfordshire: the First Premium of Thirty Sovereigns, for his Shearling Oxfordshire and Long-woolled Ram.

To Mr. William Slatter, of Stratton, Gloucestershire: the Premium of Ten Sovereigns, for his Improved Cotswold Ram, as the Second-best Long-woolled Shearling Ram.

To Mr. Charles Large, of Broadwell, Oxfordshire: the Second Premium of Thirty Sovereigns, for his 5 years old Oxfordshire and Long-woolled Ram.

To Mr. J. Hewer, of Eastington, Gloucestershire: the Third Premium of Ten Sovereigns, for his Ewes and Lambs of the Cotswold Breed.

To Mr. Charles Large, of Broadwell, Oxfordshire: the Fourth Premium of Ten Sovereigns, for his Five Ewes of the Oxfordshire Breed.

Class XI. (Pigs).

To the Right Hon. Charles Shaw Lefevre, M.P., of Heckfield Place, near Hartford Bridge, Hampshire: the First Premium of Ten Sovereigns, for the best Boar.

To Mr. George Carrington, Jun., of the Abbey, Great Missenden, Buckinghamshire: the Second Premium of Five Sovereigns, for the best Sow.

To Mr. Richard Smallbones, of Hordley, near Woodstock, Oxfordshire: the Third Premium of Ten Sovereigns, for his Three 19 weeks old Chinese and Oxfordshire Pigs.

Class XII. (Extra Stock, &c.).

To Mr. John Pinfold, of Oxford: the Sum of Five Pounds, for his 5 years old Hereford Ox.

To Mr. Samuel Druce, of Ensham, near Oxford: the Sum of Ten Pounds, for his 4 years and 4 months old Hereford Ox, bred by Mr. A. T. James, of Mornington, Herefordshire.

To Mr. J. H. Langston, of Sarsden, Oxfordshire: the Sum of Five Pounds, for his 5 years old Short-horned Cow.

[No Award made for the Horses in this Class.]

To Mr. R. Pratt, of Spilsbury, Oxfordshire: the Sum of Five Pounds, for his Three 15 months old Long-woolled Wethers.

To His Grace The Duke of Norfolk: the Sum of Three Pounds, for His Grace's three 2-Shear Wethers.

[No Award made for the Pigs in this Class.]

Lieut.-General Sir Edward Kerrison, Bart., M.P., of Oakley Park, Eye, Suffolk, exhibited 12 bushels of White Wheat; and

Mr. Henry Seawell, of Little Bookham, Surrey, 12 bushels of White Cheddum Wheat:—

Mr. William Spencer, of Adderbury, near Woodstock, exhibited 12 bushels of Improved Burwell Red Wheat; and

Mr. William Fisher Hobbs, of Mark's Hall, near Coggeshall, Essex, 12 bushels of Syer's Red Wheat.

These four specimens were selected by the Judges as the best White and Red Wheats exhibited; they were all of the harvest of 1838, and grown respectively by the parties themselves: in consequence, however, of the extent to which the intermixture of the seed in the different sacks was carried by the public in their examination of the samples, the object of the Society in reference to the contemplated trial of their individual merits was entirely defeated, and the Wheats were returned to their several owners with a complimentary Premium of Twenty Pounds to each. Precautionary measures will be taken in future to prevent a recurrence of this circumstance.

Sweepstakes.

To Mr. Matthew Paull, of Compton-Paunceford, Somersetshire: Sweepstakes of Ten Sovereigns each, for the best Devon Bull, offered by Lord Western and accepted by Mr. Paull and Mr. Peters: decided in favour of Mr. Paull's 3 years and 2 months old Bull.

To Mr. J. W. Peters, of South-Petherton, Somerset: Sweepstakes of Five Sovereigns each, for the best Devon Cow, offered by Mr. Paull and accepted by Mr. Peters: decided in favour of Mr. Peters's 9 years and 6 months old Devon Cow.

To Mr. George Carrington, Jun., of the Abbey, Great Missenden, Buckinghamshire: Sweepstakes of Two Sovereigns each, for the best Short-horned Cow, offered by Mr. Carrington and accepted by Mr. Langston; decided in favour of Mr. Carrington.

To Mr. Nathaniel Blake, of Stanton-Harcourt, near Ensham, Oxfordshire: Sweepstakes of Five Sovereigns each, for the best Ox under 4 years old, fed on Hay and Green Food only, previously to Christmas 1838, offered by Mr. Ferris and accepted by Mr. Blake; decided in favour of Mr. Blake.

Commendations.

Mr. H. Tuckwell's Improved Cotswold Long-woolled Ram, in Class X.

Mr. H. Tuckwell's Improved Cotswold and Long-woolled Ewes, with their Lambs, in Class X.

Mr. C. Large's Oxfordshire Long-woolled Ewes, with Lambs, in Class X.

Mr. R. Wood's Cotswold Ram, in Class X.

Mr. R. M. Pearce's Cotswold Ewes, with their Lambs, in Class X.

The Hon. Frederick Spencer's Bay Colt, exhibited in Extra Stock.

Exhibition of Implements.

The exhibition of implements, which was extremely well arranged, added much to the interest of the show-yard. It is true these were, for the most part, familiar to one or other of those present, but it afforded a favourable opportunity of contrasting the implements of different parts of the country; and, to many, there was novelty even in those which had in distant districts been in constant use.

The Society, at the recommendation of the judges, awarded the gold medal to the Messrs. Ransome, of Ipswich, who contributed largely to the exhibition, having sent up their waggons laden with more than six tons of machinery and implements, the superior manufacture and variety of which commanded universal approbation. The judges especially invited attention to the chaff-cutting machines. The one No. XII. is the largest and most powerful of its kind hitherto constructed: it is remarkable

for the equable slicing-cut of the two knives, each 3 feet long, fixed on the fly-wheel, and for the method of advancing the straw. The first operation is effected by the peculiar form of the cutting edge of the knives, which pass through the straw at the same angle with it from point to heel; and are so adjusted as to act with nice precision against the polished metal surface of the straw-box. The straw, which is stationary and firmly compressed by the press-board during the cut, is advanced in the interval of one knife finishing and the other commencing its action. This operation is accomplished, very exactly and simply, by means of an elliptic wheel, driven by an eccentric circular one, whose motion is derived from a latchet-wheel on the same axis acted on by a crank, so that the straw is forced rapidly forward; the press-board in front being at the same time raised to take off the friction, and brought down again with a powerful grip upon the straw, whilst the knife passes through it. A contrivance is also adapted for varying the length of the chaff from 3-8ths to 1½ inch in length. With the ½ inch cut, it was stated to produce ½ a ton of chaff per hour, with the power of 2 horses, and so on in proportion to the length of cut. This machine is equally applicable to steam or water, as to horse power.

Hand-Machines, of a similar construction, with one knife, were exhibited; as also others, cutting only one length of straw, which is advanced by a screw.

Biddell's Scarifier, invented by Arthur Biddell, Esq., of Playford, also manufactured by Messrs. Ransome, and noticed by the judges, is an implement of great utility, and constructed with much mechanical skill and power. It consists of two rows of teeth, fixed in a strong iron frame, supported by a pair of average-sized wheels, and preceded by a pair of smaller. Chisel-points are affixed to the tines, which are removeable, and hoes, of 4½ inches wide for partial hoeing, and 9 inches wide to cut the land close, substituted as occasions may require. The form of the teeth is well adapted for bringing couch-grass to the surface without breaking; and it is represented by those who have used

it as affording a great saving both in time and tillage—breaking and stirring 8 acres per diem with four horses; and being more effective on strong lands than ploughing, as it occasions less treading by horses, and produces more mould. For the purposes also of slightly paring stubbles after harvest, to prevent the seed-weeds from vegetating, and for working summer fallows, it will doubtless be found a very effective implement.*

The universal Ridge-Plough was constructed by Messrs. Ransome, under the direction of Mr. John Clarke, of Sutton Marsh, Lincolnshire, Secretary to the Wisbeach Agricultural Association, who has the merit of the invention, and to whom a silver medal has been awarded by the Society. This plough is capable of assuming four different forms, suited to four different purposes; and although, in most cases, an implement answers its purpose best when constructed for one purpose only, yet in this case the plough well admitted the variations, and was as perfect, and as well adapted to its several uses in each of its shapes, as if it had been made expressly and only for that one purpose.

The first view of this plough was in the form of a *double-tom,* for earthing up plants sown on wide ridges, or opening water-furrows. In the second, a change of the mould-boards was made, and it became a moulding-plough, of a smaller and more hoe-like description, for going between plants closely planted, loosening the soil and earthing them up. In the third it was a skeleton or broad-share plough, to which shares with curved lines were affixed, for the purpose of clearing land from weeds, &c. In the fourth it became an excellent expanding hoe, with a double-winged share in front, with curved coulters for cleaning the sides of the ridges, and hoes to be used with or without the coulters as occasion may require.

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* A member of our Society, Mr. John Brooks, a practical farmer at Hatford, in Berkshire, worked the whole of his barley-land, after turnips, this year, with Biddell's Scarifier only, and without making any use of the plough. He went over it twice, first with the chisel-points, and afterwards with the broad hoes applied. The soil is a sandy loam on the coral rag. He states that he never had a better crop.—PH. PUSEY.

Messrs. Ransome also exhibited a variety of other ploughs, of superior construction, amongst others a Bedfordshire plough with wheels, to which is attached a lever for enabling the ploughman to regulate the depth of the land-wheel while the plough is in motion. A Belgian plough for turning up turf-land: it has a wide share and concave breast, which is as wide as the wing of the share, and has a gradual rise for a few inches and then turns over rather suddenly. A *double-furrow plough,* originally invented by Lord Somerville, but now greatly improved upon: it is in general use in some parts of Lincolnshire; it does its work very effectively, and in ordinary cases produces a saving of a man and horse for two acres. The *Rutland plough* with wheels, invented by Mr. Baker, of Cottesmore, is of very simple construction, and light of draught; and the *Rackheath ploughs,* for subsoiling light land, as well as one for stirring the soil under the sod in turf-land, both invented and extensively used by Sir Edward Stracey, attracted very considerable attention.

Mr. Hart, of Wantage, exhibited some very clever swing and wheel ploughs; one also by Mr. Howard, of Bedford, of small size, with a mould-board of an excellent form, calculated to give the least resistance in turning over the furrow, was much approved. A plough, made by Roberts, of Warwick, seemed well calculated to plough light soils, and at the same time to stir the subsoil to a depth of 2 or 3 inches, by means of 2 coulters placed in the beam, the one in the furrow before, and the other in the furrow behind, the plough. Messrs. Hannam of Burcett, Davis of Oxon, J. Adams of Great Tew, Russell of Kenilworth, and King of Buckland, exhibited ploughs of various construction.

A plough, on an entirely new principle, was shown by John Le Boutillier, of Jersey. Its object is to raise potatoes, and separate them from the soil, casting them clear of the furrow. It is effected by a succession of paddles, worked nearly at right angles to the mould-board, varying in the speed and force of its revolutions according to the pace of the horses. This implement was

set to work on the day succeeding the show, and performed its work well. It appeared also calculated to throw out root-weeds from the furrow slice, and was especially applicable to the equal distribution of lime or light manures generally, and producing a fine and equal tilth.

Mr. J. Gibbs, of Elsfield, exhibited a draining-plough, on the principle of the mole-plough, and Mr. White, of Courdon, a new subsoil-plough. There were three thrashing-machines in the yard. One, a four-horse portable one, by Messrs. Ransome, was commended for the general good workmanship displayed in it, and the proper proportion of its parts, both as to durability and getting up the required speed, which is said to be 310 revolutions of the beating-drum to 1 of the horses. It was also particularly deserving of attention from the application of the superior toothed wheels, first demonstrated by Professor Airy, and subsequently reduced to practical shape by Professor Willis, in his communication to the Institution of Civil Engineers.

Mr. Garnett exhibited a threshing-machine which is said to thresh from 40 to 50 quarters per diem. It was put to work, and attracted much notice from the regularity of its motions and the great strength of its parts. Mr. Hart's portable threshing-machine differed in principle from those already mentioned, the beater of the drum being only one inch broad, instead of three or four inches, which is the usual breadth. The effect produced by the narrow beater is, that instead of beating out the corn from the straw, as is done by the flail and other threshing-machines, the edge of the beater only comes in contact with the unthreshed corn, and strips off the corn and chaff, without injuring either it or the straw. The superior character of the working of this machine recommends it to notice.

Many excellent drills claim notice. One called the Suffolk drill, by Messrs. Garrett and Sons, has a simple invention to perfect the delivery of the corn when the seed is damp, or when lime or other material is mixed with it. This is effected by a small piece of iron like a pendulum, which is suspended over

each set of cups in the cylinders, and which strikes the handle of each cup as it delivers the corn, which is then shaken completely out. This drill has also a swing lever to move the coulters to either side when drilling land which is not level, and so constructed as to be easily transformed to different sizes.

Mr. Jeago's (of Peasinghall) well-known Suffolk drill was much admired; and a *drop drill,* by Mr. Grounsell, of Louth, received a silver medal from the Society for the novelty and value of the principle involved. This drill has an inner wheel attached to the main wheel of the implement, which, at stated intervals, acts upon a crank, which withdraws a slide from each cup, on the principle of a shot-belt, and deposits the manure at given distances, thereby greatly economising artificial manures, such as bones. This machine is evidently capable of much improvement, but it may be expected to engage the attention of mechanics, as the object to be attained is extremely desirable. When moved by hand it appeared to deposit the manure very regularly at a foot distant, but probably the more rapid pace of a horse would have let it down in a more continuous stream. This may, however, be in a great measure obviated by increasing the diameter of the inner wheel. A *press-roller,* by Hart, of Wantage, appeared well adapted to light lands not apt to clog. Its iron frame, and the manner in which it was attached to the shafts, was neat, strong, and cheaply constructed.

A corn dressing-machine, by Mr. T. Salter, of Hallingbury, Essex, was commended by the judges, and the Society's silver medal was awarded to it. This machine receives the corn in an inclined wire cylinder, through which it is driven by an iron revolving rod armed with short knives, which entirely supersede the use of the common barley-chopper, breaking the beard or tail off barley or oats, and separating the dirt and seeds from the chaff. It is then delivered into the sieves attached, through which the blowers drive a very considerable force of wind. The whole may be worked by two men, one to turn the wheel and the other to serve the hopper.

A newly-invented machine, called a "Scorcher," invented by Messrs. Jones and Draper, of Chorlbury, for burning straw,

weeds, or even charring the soil after harvest, attracted the observation of the curious. It was about three feet wide, on wheels, containing a fire-box and a fan, by which the flame was driven through a narrow aperture,

A *cat's-claw drag-harrow,* by Mr. Hannam, was light, and the teeth of an effective form; but it appeared that in the action of cleaning much ground might be missed. A set of light iron harrows were also of an ingenious construction; and a machine, by Moody, of Wilts, for converting turnips, potatoes, &c. into pulp, to be mixed with chaff, attracted considerable notice.

Gardner's excellent turnip-slicer, and a similar one of Edwards', were exhibited, as also one of Hart's, the cutting part of which resembled that of Gardner; but it was placed on the side of a cast-iron disk, instead of being attached, as Gardner's, to the circumference of a cylinder.

Several other implements were on the ground, together with rollers, and two admirably-built waggons by Stratton of Bristol, and King of Berkshire.

Award of Premiums.

To Messrs. RANSOME, of Ipswich: the Society's GOLD MEDAL, for their excellent display of Implements, and especially their Chaff-cutting Machines and Biddell's Scarifier.

To Mr. JOHN CLARKE, of Long Sutton, Lincolnshire: the Society's SILVER MEDAL, for his Universal Ridge Plough.

To Mr. GROUNSELL, of Louth: the Society's SILVER MEDAL, for his Drop Drill for depositing wet or dry manure with the seed.

To Mr. T. SALTER, of Hallingbury, Essex: the Society's SILVER MEDAL for his Machine for dressing corn.

To Mr. JOHN LE BOUTILLIER, of Jersey: FIVE POUNDS, for his Paddle-Plough for raising Potatoes.

Having thus given an account of the show, it only remains to express a hope that next year a still better exhibition will be made. This is the first occasion on which such a show has been attempted in England, and it is probable that the experience derived from this first attempt will lead to great improvement at the future exhibitions of the Society.

ENGLISH AGRICULTURAL SOCIETY.

RULES.

1. The English Agricultural Society consists of a President, twelve Trustees, twelve Vice-Presidents, Governors, and Members.

2. The President is annually elected, and is not re-eligible for three years.

3. The President, Trustees, and Vice-Presidents, are elected from the Governors.

4. The Governors pay 5*l.* annually, the Members 1*l.*, with the power to compound for life by the payment in one sum of ten annual subscriptions.

5. The Committee of Management consists of the President, Trustees, Vice-Presidents, and fifty Subscribers; twenty-five of whom go out annually by rotation, but may be re-elected.

6. The Committee have the power of appointing Sub-Committees of any subscribers to the Society, of all which sub-committees, the President, Trustees, and Vice-Presidents are members *ex officio.*

7. One general Annual Meeting will be held every year in London, in the month of May; and one in the Country, in the months of July or August.

8. The Committee and all the officers are elected at the annual meeting in London, but do not enter upon the duties of their respective offices until after the annual meeting in the Country.

9. All governors and honorary members have the power of attending meetings of the committee, but have not the privilege of voting unless forming part of that committee.

10. Every candidate for admission into the Society as governor or member must be proposed by a subscriber. The proposer to specify in writing the name, rank, and usual place of residence of the candidate; and every such proposal to be read at the first meeting of the committee next after such candidate shall have been proposed, and every such candidate to be eligible at the then succeeding meeting.

11. No subscriber shall enjoy the privileges of the Society or attend the meetings, whose subscription shall be in arrear.

12. The Committee of Management will meet every Wednesday at twelve o'clock for the discharge of business, three to be a quorum; but no grant of money shall be made at any such meeting, nor shall any business of importance be considered as fully decided upon until confirmed at a subsequent monthly meeting.

13. The meeting on the first Wednesday in every month shall be the monthly meeting, five to be a quorum, when the general business of the Society shall be transacted, grants of money made, reports of sub-committees considered and confirmed, if approved.

14. At all meetings of the committee when the quorum is assembled

in the absence of the President, the Trustee, or Vice-President of the highest rank shall take the chair. If no Trustee or Vice-President be present, the meeting will elect their chairman.

15. The first business at each meeting of the committee to be the reading of the minutes of the preceding meeting.

16. In case of an equality of votes, the question to be decided by the casting vote of the chairman.

17. All drafts for money shall be signed by the chairman of the committee and countersigned by one of the Trustees and the Secretary, but only on the recommendation of the Committee of Finance.

18. The Committee may at any monthly meeting discontinue the weekly meetings of the Committee for any period not exceeding two months.

19. No prizes shall be allotted except at the monthly meetings in May, June, and July.

20. No rule or bye-law shall be altered unless due notice of such change shall be given at a meeting of the Committee, and carried at the two subsequent monthly meetings.

21. Subscriptions are paid in advance, and are due on January 1st; but subscribers elected in December are liable only for the year ensuing.

22. It is a fundamental rule of the Society, that no question shall be discussed, at any of its meetings, of a political tendency, or which shall refer to any matter to be brought forward or pending in either of the Houses of Parliament.

RULES OF COMPETITION FOR PRIZES.

1. That all information contained in prize essays shall be founded on experience or observation, and not on simple reference to books, or other sources.

2. That drawings, specimens, or models shall accompany writings requiring them.

3. That all competitors shall transmit a sealed note, containing their names and addresses, with a motto on it to correspond with one inscribed on the essay.

4. That the Society shall have the power to publish the whole or any part of the essays which gain the prizes, and the other essays will be returned on the application of the writers.

5. That the Society is not bound to give an award, unless they consider one of the essays worthy of a prize.

6. That, in all reports of experiments, the expences shall be accurately detailed.

7. That only the imperial weights and measures are those by which calculations are to be made.

8. That no prize be given for any essay which has been already in print.

9. That prizes may be taken in money or plate at the option of the successful candidate.

All Essays must be sent to the Secretary, 5, Cavendish Square.

ESSAYS AND REPORTS ON VARIOUS SUBJECTS.

I.—Premiums for 1840.

PRIZE ESSAYS.

1. Storing Turnips.

Ten Sovereigns will be given for an account, founded on experience, of the best mode of Storing Turnips, by which they may be preserved in their natural state till the April or May succeeding the time of their being taken up.

Competitors are required to state—

1. Their experience of the methods now in practice for Storing Turnips, viz., on the surface of the soil, in pits, in sheds, or in houses.
2. The different sorts of covering, and their thickness.
3. The depth of pits.
4. The relative keeping virtues of different species, whether of Swedes or of common turnips.
5. The best modes of taking up and cleaning, with reference to their preservation.
6. Any new methods recommended.

2. Admixture of Soils.

Twenty Sovereigns will be given for the best account of the Transposition and Admixture of Soils, as in the application of a clay dressing to a light sand.

Competitors must state the results of actual experiments.

3. Early Spring Feed.

Twenty Pounds will be given for the best Essay on the Grasses and Leguminous Plants best adapted to arable cultivation for early feed in the spring.

The points of comparison to which the Society would wish the attention of competitors for this prize to be mainly directed are the following—

1. Earliness of vegetation.
2. Power of resisting severe frost.
3. Abundance of produce.
4. Nutritive quality.
5. Effect on the soil and on the succeeding crop.
6. The method of cultivation.

The species or variety of the plants sown should be accurately designated, and also the quality of the soil on which they have been grown.

4. Insects Injurious to Cereal Crops.

Twenty Pounds will be given for the best account of the Insects prejudicial to the Cereal Crops:—viz., wheat, barley, oats, and rye, in their different stages of growth. The descriptions of the insects must be entomological, and any remedies proposed must be the result of actual experiment.

5. Plantations.

The Gold Medal will be given for the best account of the Forest Trees best fitted for plantations in England.

Competitors must state—

1. The trees best suited to various soils of inferior description, distinguishing each sort as clay, peat, chalk, sand.
2. Whether the trees should be mixed together or in separate masses.
3. The best mode of planting, and expence.

6. Underwood.

The Gold Medal will be given for the best account of the Cultivation and Management of Underwood founded upon actual experiment.

Competitors are required to state—

1. The nature of the soil, and, when it has been recently planted, the mode of preparing it.
2. The average number of plants per acre.
3. The description of underwood growing.
4. The best sorts to be planted.
5. The cost of fencing and draining.
6. The comparative produce of not less than five acres under the common, and under an improved system of management.

7. Rotation of Crops.

Ten Sovereigns will be given for an account of the Rotation of Crops best suited to heavy lands.

The object of this inquiry will be, the combination, within a given period, of the greatest number of crops, including winter or half-crops consumed before they arrive at maturity, with profitable return, and with improvement of the condition of the soil.

8. Weeds in Meadows.

Twenty Sovereigns will be given for the best account of the Weeds in Meadows and Pastures.

Competitors must state—

1. What weeds are found in old pastures and in newly laid down grasses respectively.
2. The effect of these weeds on the animals which feed on them.
3. More particularly the effect on the milk of cows, and on the butter and cheese produced from that milk.
4. The comparative value of the butter and cheese from pastures and artificial grasses infested with weeds, and from those which are clear of them.
5. The best mode of eradicating such weeds from pastures, from meadows and from artificial grasses.

9. Gypsum as a Manure.

Ten Sovereigns will be given for the best account of the application of Gypsum as a Manure to artificial Grasses; stating—

1. The period and mode of application.
2. The state of the crop and nature of the grass.
3. The comparative produce of crops to which gypsum has, and has not, been applied.

10. Diseases of Wheat.

Fifteen Sovereigns will be given for the best Essay on Smut, Mildew, and Diseases affecting the Crop in its more advanced stages.

1. How far derivable from internal or external causes.
2. First intimation of their presence, under what circumstances, and in what soils they are most prevalent.
3. How far prevented by preparation of soil or seed.
4. What treatment is recommended to arrest their progress.

These Essays must be sent in to the Secretary on or before March 1, 1840.

AGRICULTURAL IMPLEMENTS.

1. Gorse-Crushing Machine.

Twenty Sovereigns will be given for the cheapest and most effective Gorse-Crushing Machine.

1. The machine produced must be on a working scale, and at a cost that will be attainable by the occupiers of the smallest farms.
2. It must be capable of reducing the material to a pulpy state for the mastication of ruminating animals, as cows and sheep.

2. Any Implement.

For the invention of any new Agricultural Implement, such sum as the Society may think proper to award.

AGRICULTURAL OPERATIONS.

Subsoil Plough.

Twenty Sovereigns will be given for the most satisfactory application of the Subsoil Plough to the improvement of land, whether for the purpose of correcting excessive moisture or dryness of soil.

The Society will require from competitors—

1. An accurate description of the plough used; and
2. Of the quality and state of soil and subsoil, with an estimate of its annual value before the commencement of the operation.
3. An account of the drains cut (if any), their depth and distance from each other.

4. A detailed statement of the subsoil and other ploughings to which the grounds have been subjected.
5. An account of any manure expended.
6. Of the bulk of produce of each crop.
7. Of the total expence of the operation so far as it has proceeded, and
8. An authentic estimate of the improved value of the land resulting therefrom.

CATTLE.

Prizes for Improving the Breed of Cattle.

Class I.—Short-Horns.

1. To the owner of the best Bull calved previously to the 1st of January, 1838	Thirty Sovereigns.
2. To the owner of the best Bull calved since the 1st of January, 1838, and more than one year old	Fifteen Sovereigns.
3. To the owner of the best Cow in milk . .	Fifteen Sovereigns.
4. To the owner of the best in-calf Heifer, not exceeding three years old	Fifteen Sovereigns.
5. To the owner of the best Yearling Heifer .	Ten Sovereigns.
6. To the owner of the best Bull Calf . . .	Ten Sovereigns.

Class II.—Herefords.

1. To the owner of the best Bull calved previously to the 1st of January, 1838	Thirty Sovereigns.
2. To the owner of the best Bull calved since the 1st of January, 1338, and more than one year old	Fifteen Sovereigns.
3. To the owner of the best Cow in milk . .	Fifteen Sovereigns.
4. To the owner of the best in-calf Heifer, not exceeding three years old	Fifteen Sovereigns.
5. To the owner of the best Yearling Heifer .	Ten Sovereigns.
6. To the owner of the best Bull Calf . . .	Ten Sovereigns.

Class III.—Devons.

1. To the owner of the best Bull calved previously to the 1st of January, 1838	Thirty Sovereigns.
2. To the owner of the best Bull calved since the 1st of January, 1838, and more than one year old	Fifteen Sovereigns.
3. To the owner of the best Cow in milk . .	Fifteen Sovereigns.
4. To the owner of the best in-calf Heifer, not exceeding three years old	Fifteen Sovereigns.
5. To the owner of the best Yearling Heifer .	Ten Sovereigns.
6. To the owner of the best Bull Calf . . .	Ten Sovereigns.

Class IV.—Cattle of any Breed, or Cross,

Not qualified for the foregoing Classes.

1. To the owner of the best Bull calved previously to the 1st of January, 1838	Thirty Sovereigns.
2. To the owner of the best Bull calved since the 1st of January, 1838, and more than one year old	Fifteen Sovereigns.
3. To the owner of the best Cow in milk . .	Fifteen Sovereigns.
4. To the owner of the best in-calf Heifer, not exceeding three years old	Fifteen Sovereigns.
5. To the owner of the best Yearling Heifer .	Ten Sovereigns.
6. To the owner of the best Bull Calf . .	Ten Sovereigns.

Class V.—Horses.

1. To the owner of the best Cart Stallion . .	Twenty Sovereigns.
2. To the owner of the best Cart Mare and Foal.	Ten Sovereigns.
3. To the owner of the best Stallion for breeding hunters, carriage-horses, or roadsters, which shall have served mares during the season of 1840, at a price not exceeding 3*l.* each .	Thirty Sovereigns.

SHEEP.

Prizes for Improving the Breed of Sheep.

Class VI.—Leicester.

1. To the owner of the best Shearling Ram .	Thirty Sovereigns.
To the owner of the second-best ditto . .	Ten Sovereigns.
2. To the owner of the best Ram of any other age	Thirty Sovereigns.
3. To the owner of the best pen of 5 Ewes with their Lambs	Ten Sovereigns.
4. To the owner of the best pen of 5 Shearling Ewes	Ten Sovereigns.

Class VII.—South Downs, or other short-woolled Sheep.

1. To the owner of the best Shearling Ram .	Thirty Sovereigns.
To the owner of the second-best ditto . .	Ten Sovereigns.
2. To the owner of the best Ram of any other age	Thirty Sovereigns.
3. To the owner of the best pen of 5 Ewes with their Lambs	Ten Sovereigns.
4. To the owner of the best pen of 5 Shearling Ewes	Ten Sovereigns.

Class VIII.—Long-woolled Sheep,

Not qualified to compete for Class VI.

1. To the owner of the best Shearling Ram .	Thirty Sovereigns.
To the owner of the second-best ditto . .	Ten sovereigns.
2. To the owner of the best Ram of any other age	Thirty Sovereigns.
3. To the owner of the best pen of 5 Ewes with their Lambs	Ten Sovereigns.
4. To the owner of the best pen of 5 Shearling Ewes	Ten Sovereigns.

N.B.—The Sheep exhibited for any of the above Prizes must not be shorn before the 1st of May, nor after the 1st July, 1840.

Class IX.—Pigs.

1. To the owner of the best Boar . . .	Ten Sovereigns.
2. To the owner of the best Sow	Five Sovereigns.
3. To the owner of the best pen of 3 Pigs of the same litter, above 4 and under 9 months old.	Ten Sovereigns.

Class X.—Extra Stock, Implements, Roots, and Seeds.

For Extra Stock of any kind, not shown for any of the above Prizes, and for Implements, Roots, Seeds, &c., Prizes will be awarded and apportioned, by the Committee and Judges, to the value, in the whole, of	Fifty Sovereigns.

SEED WHEAT.

To the Exhibitor at the Cambridge Meeting of the best 12 bushels of White Wheat, of the harvest of 1839, grown by himself . . .	Fifty Sovereigns.
To the Exhibitor at the Cambridge Meeting of the best 12 bushels of Red Wheat, of the harvest of 1839, grown by himself	Fifty Sovereigns.

Each of these 12 bushels will be sealed by the Judges; and a thirteenth bushel of each of the same varieties will be exhibited, as a sample, to the public.

N.B.—These Prizes will be awarded at the General Meeting in December, 1841.

The two best samples, without distinguishing between the two, will be selected by Judges appointed at the Cambridge Meeting, and will be sown in the Autumn of 1840, by three farmers, under the direction of the English Agricultural Society, who will make their Report, upon which the Prize will be awarded. Ten Sovereigns will be given to the Exhibitor of the one of these two samples who shall not obtain the Prize; or, if from the produce when sown neither of the two shall appear to deserve a Prize, Ten Sovereigns will be given to the Exhibitors of each.

GENERAL REGULATIONS.

No Stock can be admitted for exhibition unless the necessary Certificates, in the form prescribed, and signed by the Exhibitor in the manner directed, be delivered to the Secretary, or sent post paid, so as to reach the Society's Rooms, 5, Cavendish-square, on or before the 1st July next.

The name and residence of the Breeders of all animals exhibited, when known, should be stated.

Non-Subscribers to pay five shillings for every head or lot of live stock before obtaining a ticket of permission to bring their cattle into the Show-yard.

The same animal cannot be entered for two classes.

The age of animals, in all cases, to be computed from the day of birth.

The sheep exhibited for any of the prizes must not be shorn before the 1st May, nor after the 1st July, 1840.

Persons intending to exhibit Extra Stock must give notice to the Secretary, on or before the 1st July next.

Stock of every description must be in the Show-yard before Eight o'clock on the morning of exhibition, and will remain in the charge of the Society until four o'clock on the afternoon of the following day.

No animal can be removed during the Show without leave.

Whenever reference is made to weights or measures, it is to be considered that the Imperial weights and measures are alone referred to.

Persons intending to exhibit Implements, Roots, Seeds, &c., must give notice of their intention to the Secretary, and furnish him with a description, at least one week before the show; and all such Implements, Roots, Seeds, &c., must be brought to the Show-yard on the day previous to exhibition.

Persons wishing to enter into any Sweepstakes should apprize the Secretary of their intention.

II.—Premiums for 1841.

REPORTS OF EXPERIMENTS.

1. Varieties of Wheat.

Twenty Sovereigns, or a Piece of Plate of that value, will be given for the best Report on the Comparative Merits of different Varieties of Wheat.

Competitors will be required to state—

1. Preparation and quantity of the seed; time and method of sowing; relation to preceding and following crops; nature of the soil.
2. Power to withstand severe winters.
3. Time of flowering and of maturity.
4. Tendency to degenerate, and liability to disease.

5. Amount of produce in grain and straw, and the relative quantities of flour and offal.
6. Quantity of bread produced from 18 lbs. of flour, according to the process described by Colonel Le Couteur, in the present Number of the Journal for 1839, page 115.

Not less than a quarter of an acre to be planted with each variety.—It would be desirable that competitors should consult Colonel Le Couteur's Work upon Wheat.

2. Varieties of Barley.

Twenty Sovereigns, or a Piece of Plate of that value, will be given for the best Report on the Comparative Merits of different Varieties of Barley.

Competitors will be required to state—

1. Preparation and quantity of the seed; time and method of sowing; relation to preceding and following crops; nature of the soil.
2. Power to withstand drought or extreme wet.
3. Tendency to degenerate, and liability to disease.
4. Time of flowering and of maturity.
5. Amount of produce in grain and straw.
6. Malting qualities.

3. Varieties of Turnips.

Ten Sovereigns, or a Piece of Plate of that value, will be given for the best Report on the Comparative Merits of different Varieties of Turnips.

Competitors will be required to state—

1. The comparative produce per acre of each variety treated of.
2. The nutritive qualities as compared with weight; distinguishing—
   (*a*) The varieties possessing early maturity appropriate for autumn stocking;
   (*b*) The more productive and nutritive kinds for general feeding; and,
   (*c*) The more hardy varieties for spring and late consumption.

4. Effects on subsequent Crops of Wheat.

Twenty Sovereigns, or a Piece of Plate of that value, will be given for the best Account of the Comparative Effects of Crops of Beans, Clover, Vetches, Potatoes, Rye-grass, or any other crop, upon a subsequent crop of Wheat.

Competitors must state—

1. The soil on which the experiment was tried.
2. The crops preceding the wheat, and the manner of cultivating it.
3. The quantity of manure applied.
4. Whether fed or mown, and the quantity of produce if mown.
5. The species of wheat sown.
6. The manner in which the wheat was cultivated; and if manured, the quantity applied.
7. The produce in bushels of the crop of wheat.
8. Any other particulars that may seem important.

FOOD FOR LABOURERS.

Ten Sovereigns, or a Piece of Plate of that value, will be given for the best Directions to enable Labourers to prepare wholesome, nutritious, and palatable Food, in the most economical and easy manner.

As the object of the Society in offering this prize is to procure such instructions for agricultural labourers as may enable them to supply themselves with the greatest quantity of nutriment which the means at their command will produce, and to prepare a warm, comfortable, and nutritious meal for themselves and their families when they return home from their day's work;—the Competitors for it are requested to observe:

1. That the receipts must be given in such a plain manner as may render them available to a labourer, or his wife, who are unaccustomed to cookery.
2. That the receipts must be such as may be used without requiring any apparatus which an agricultural labourer does not usually possess.
3. That they shall not require the use of any ingredients which he may not easily procure, either from his garden or in agricultural villages. This condition is not intended to preclude the recommendation of fish as a part of any dish.
4. The cost of the different dishes for which receipts are given must be accurately stated.

ON MANURES AND SOILS.

1. Application of Lime.

Ten Sovereigns, or a Piece of Plate of that value, will be given for the best Account of Experiments on the application of Lime as a manure.

The Competitors will be required to state—

1. How many years they have used lime as a manure.
2. How many acres they have limed each year.
3. What quantity they have put on per acre.
4. On what sort of soil.
5. At what time of the year.
6. For what crop.
7. Whether with or without manure.
8. In what manner applied.
9. What effect on the crop.
10. What effect on the succeeding crop.
11. The price of the lime.
12. Whether they continue to use it.
13. The chemical description of lime they use.
14. Any particulars generally with respect to lime.

2. Nitre and Cubic Nitre.

Twenty Sovereigns, or a Piece of Plate of that value, will be given

for the best Account of Experiments on the application of Nitres as Manures, including Saltpetre (the nitrate of potash) and Cubic Nitre (the nitrate of soda).

Competitors will be required to state—

1. The quantity and mode of these applications, whether used before sowing, along with the seed, or after the blade is up.
2. Every particular of each experiment; and a comparison made with the same quantity of ground sown both without manure and also with common yard-dung; stating the value of the manure in every case.
3. The result at different periods of the growth.
4. The conclusion come to from the experiments.
5. Not less than a quarter of an acre to be taken for each experiment; and to be varied as much as possible.

3. Improvement of Peat-Soils.

Twenty Sovereigns, or a Piece of Plate of that value, will be given for the best Essay or Report on the most successful means by which the Improvement of Peat Soils may be effected.

Competitors will be required to state the following particulars :—

1. Description of the mode, so far as it can be ascertained, in which the peat has been formed, whether by rain-water lodging on the surface, the oozing of springs, or under a body of stagnant water.
2. Description of the plants, from the decay of which the peat appears to be formed, and of the state of decomposition in which they are found.
3. Chemical account of any acid or bitter principle injurious to vegetation which may be found in the peat.
4. Account of any substances applied to the peat, either for correcting its chemical defects or improving its consistence.
5. Level of the water in the neighbouring ditches in winter and summer.
6. General treatment and mode of cropping.

N.B.—General Conditions for all Experiments on Soils or Manures.

1. The nature and depth of the soil.

2. The proportions of clay, sand, lime, or other substances, of which the soils are composed: or, otherwise, to send specimens of the soils (in quantities of a pound or pint of each variety) to the Secretary, on his application for them.

3. The nature of the subsoil.

4. When the ground is not level, the degree in which it slopes, and the direction (north, east, &c.) of its inclination, as found by the compass.

5. The two or three preceding crops; the manure put on for them, and the produce of these crops.

ON AGRICULTURAL OPERATIONS AND IMPLEMENTS.

1. Subsoil and Trench Ploughing.

Twenty Sovereigns, or a Piece of Plate of that value, will be given for the most satisfactory Experiment on the Comparative Merits of the two processes of Subsoil and Trench Ploughing.

The Society will require from Competitors—

1. An accurate description of the ploughs used.
2. Of the quality and state of soil and subsoil, with an estimate of its annual value before the commencement of the operation.
3. An account of the drains cut (if any), their depth and distance from each other.
4. A detailed statement of the subsoil and other ploughings to which the grounds have been subjected.
5. An account of any manure expended.
6. Of the bulk of produce of each crop.
7. Of the total expence of the operation, so far as it has proceeded; and,
8. An authentic estimate of the improved value of the land resulting therefrom.

As the object of the Society is to ascertain, as far as possible, the advantages of subsoil ploughing (in which the subsoil is divided by the plough, but left in its original situation), and of trench ploughing (in which the subsoil is not only divided, but is also brought to the surface), they strongly recommend to competitors that the two processes should be conducted on a piece of ground fairly divided into two lots of equal quality, and that the drains cut in each lot, as well as any assistance afforded by manure, should be similar on each of the lots.

2. Single-horse Carts.

Ten Sovereigns, or a Piece of Plate of that value, will be given for the most satisfactory account of any experiments to compare the relative advantages of the single-horse carts which are generally used in Scotland with any mode of conveying agricultural produce which is practised in any part of England, or in any foreign country; having regard to economy of labour both of men and animals, quickness of work, and facility in loading and conducting the carriage.

3. Agricultural Mechanics.

Fifty Sovereigns, or a Piece of Plate of that value, will be given for the best Essay on the Present State of Agricultural Mechanics, and on the Improvement of which the various Implements now in use may be susceptible.

These Essays must be sent in to the Secretary on or before March 1st, 1841.

DONATIONS OF BOOKS.

Titles of Books.	*Donors.*
Highland and Agricultural Society of Scotland: Royal Warrant and new Supplementary Charter. 4to. Edinb. 1834	THE HIGHLAND SOCIETY.
——— Premiums offered in 1839. 8vo. . .	THE SAME.
——— Quarterly Journal of Agriculture, and the Prize Essays and Transactions. Nos. 40 to 46. 8vo. Edinb. 1838-9	THE SAME.
Yorkshire Agricultural Society: General Statement, Award of Premiums, Prize Reports, &c., for 1838. 8vo. Lond. 1838	J. WALBANKE CHILDERS, ESQ., M.P.
Surrey Agricultural Association: Report, List of Members, Prizes, &c., for 1837. 12mo. (and 3 fol. sheets). Epsom. 1837	THE SOCIETY.
Wiltshire Agricultural Society: General Rules and Orders, Officers and Members, Premiums, &c. 12mo. Salisbury. 1825	JOHN BENETT, ESQ., M.P., President.
Manchester Agricultural Society: Premiums, Rules, Officers, and Members, for 1834. 8vo. Manchester. 1834 .	THE SOCIETY.
Chippenham Agricultural Association: Rules, Orders, Premiums, and List of Members, for 1838. 8vo. Chippenham. 1838	THE SOCIETY.
West Devon and East Cornwall Agricultural Society: Rules, Orders, Premiums, Members, &c., for 1835. 8vo. Launceston. 1835	THE SOCIETY.
Jersey Agricultural and Horticultural Society: Annual Reports for 1837 and 1838. 8vo. Jersey. 1837-8 .	COL. LE COUTEUR.
Agricultural and Horticultural Society of India: Annual Report for 1838, and Proceedings of Jan. and Feb., 1839. 8vo. Calcutta. 1839	THE SOCIETY.
Evans and Ruffy's Farmer's Journal, and Agricultural Advertiser, Weekly Newspaper, the series extending (with the exception of deficient Numbers) from 1812 to 1832	CLARK HILLYARD, ESQ.
The Farmer's Magazine and Monthly Journal of Proceedings affecting the Agricultural Interest, Jan. to July, 1839. 8vo. London. 1839	WILLIAM SHAW, ESQ.
The Veterinarian, or Monthly Journal of Veterinary Science, for June, July, September, 1839	WM. YOUATT, ESQ.

Titles of Books.	*Donors.*
Labourer's Friend Magazine, Nov., 1834; Nov., 1835; Dec., 1836; Oct., Nov., 1837; Jan. to Oct., 1838; Jan. to Sept., 1839. 8vo. London. 1834-9.	The Labourer's Friend Society.
Horticultural Society of London: Transactions of the Society, Old Series, Vol. I. to VII.; New Series, Vol. I., and of Vol. II. Parts 1 to 4. 4to. London. 1820-39 . ——— Proceedings of the Society, Nos. I. to IV. 8vo. 1838 ——— List of Members. 4to. 1837 . . .	The Horticultural Society.
Geological Society of London.—Proceedings of the Society. No. 60. 8vo. Lond. 1839	The Society.
Royal Asiatic Society of Great Britain and Ireland.—Journal of the Society, No. III. 8vo. Lond. 1835. Proceedings of the Society, March 19 and May 7, 1836; April 8, May 26, June 16, and Aug. 5, 1837. 8vo. Lond. 1836-7.	The Society.
Royal Geographical Society of London.—Journal of the Society, Vol. VIII., Part 2. 8vo. Lond. 1838 . .	The Society.
Statistical Society of London.—Journal of the Society, Nos. 1 to 12 (excepting No. 7). 8vo. Lond. 1838-9.——Quarterly Journal of the Society, Vol. II., Part 4. 8vo. Lond. (July) 1839	The Society.
Institution of Civil Engineers.—Minutes of Proceedings: Session of 1839. 8vo. Lond. 1839.——Charter, Bye-Laws, and Regulations. 8vo. Lond. 1839 . .	The Institution.
College for Civil Engineers.—Prospectus. 8vo. Lond. 1839	The Director.
Society of Land-Agents and Surveyors.—Rules, Regulations, Bye-Laws, and Syllabus of Objects. 8vo. Lond. 1837.	The Society.
Winkfield School of Industry.—Report for 1838; with Rules and Regulations. 8vo. Windsor. 1839. . .	The Rev. W. L. Rham, M.A.
The Farmer's Guide in Hiring and Stocking Farms. By the Author of "The Farmer's Letters" (Arthur Young). 2 vols. 8vo. Lond. 1770	John Yelloly, M.D. F.R.S.
Practical Agriculture. By R. W. Dickson, M.D. 2 vols. 4to. Lond. 1805	T. Raymond Barker, Esq.
Flemish Husbandry (Libr. Useful Knowl.), No. 1. 8vo. Lond. 1837	The Author.
On the Nature and Property of Soils. By John Morton. 12mo. Lond. 1838	The Author.
Hortus Gramineus Woburnensis, 4th Ed. (including "Weeds of Agriculture.") By George Sinclair, F.L.S. F.H.S. 8vo. Lond. 1839	Messrs. Ridgway.
The Forest Planter and Pruner's Assistant. By James Main, A.L.S. 12mo. Lond. 1839	The same.
A Treatise on the Breeding, Rearing, and Fattening of Poultry. By the same. 12mo. Lond. 1839 . . .	The same.

Titles of Books.	*Donors.*
Doncaster Agricultural Association.—Report of the Committee on the Advantages of Mangel Wurtzel as a Fallow Crop. 8vo. Lond. 1830	J. Walbanke Childers, Esq., M.P.
Remarks on Thorough-Draining and Deep-Ploughing. By James Smith, Esq., of Deanston Works. (From Report of Drummond's Agric. Museum.) 8vo. Stirling. 1837.	Messrs. Drummond, of Stirling.
Some Account of the Employment of Spade-Husbandry on an extensive Scale in the County of Norfolk. By John Yelloly, M.D., F.R.S. 8vo. Lond. 1838 . .	The Author.
A Practical Essay on Milking. By William Blurton, of Field Hall, Uttoxeter. 8vo. Lond. 1839 . .	The Author.
Observations on the Anatomy, Habits, and Economy of *Athalia Centifoliæ*, the Saw-fly of the Turnip. (Prize Essay.) By George Newport, Esq., M.R.C.S., M.E.S. 8vo. Lond. 1838	The Author.
The Cottager's Bee-Book; founded on 20 years' experience. By Richard Smith. 12mo. Oxford. 1839 . .	The Author.
Statement respecting the "Trotsworth Liquid Manure." By G. Kimberley. (Sheet) Folio. Egham. 1838 .	The Author.
Statement respecting the "Rohan Potatoe." By the same. (Sheet) 4to. Egham. 1838	The Author.
State and Prospects of British Agriculture; being a Compendium of the Evidence given before a Committee of the House of Commons appointed in 1836 to inquire into Agricultural Distress. With a few Introductory Observations. By William Hutt, Esq., M.P. 8vo. Lond. 1837.	J. Walbanke Childers, Esq., M.P.
Recent Measures for the Promotion of Education in England. Eighth Edition. 8vo. Lond. 1839	Messrs. Ridgway.
Substance of Lord John Russell's Speech on the Government Plan of National Education. Seventh Ed. 8vo. Lond. 1839.	The same.
Substance of the Marquess of Lansdowne's Speech on the same Question. Seventh Ed. 8vo. Lond. 1839 .	The same.
On Infant Schools of Horticulture and Agriculture in France; Hints for National-School Masters; on Tanks; on Bee-keeping; and on keeping a Cow. (Anonymous.) 8vo. Lond. 1839	The Editor.
Extract from the Rev. W. S. Cotton's Short Letter to Cottagers. 12mo. Hailsham. 1838	The same.
Address to Agriculturists on Provincial Establishments for making cheap Salt from Sea-water. By R. Cort. 8vo. Lond. 1838	The Author.
On the United Application of particular Patents for manufacturing Salt, with an Essay on the Value of the Article. 8vo. Lond. 1838	The Author.

Titles of Books.	*Donors.*
On the most Profitable Plans of Agriculture and Grazing; with Remarks on the Poor Rates, Employment of the Poor, &c.; and on the Destruction of the Black Palmer. By an Experienced Farmer (Thomas Cosons, of Ropley, near Alresford, Hants.) Second Ed. 8vo. Lond. 1837	The Author
On the Improvement of Agriculture by Management of the Farinaceous Seeds and Pulse; with Outlines of a Plan to establish an Agricultural School of Industry. By Henry Hiort. 8vo. Lond. 1832	The Author.
Plan for Regulating the Rent of Land in Scotland; with safe Principles for Leases. Third Ed. (Anonymous.) 8vo. Edinb. 1834	The Author.
Importance of Agriculture to a State; and the Necessity and Principles of its Protection. By Donald Bain, Accountant, Edinburgh. 8vo. Lond. 1834	The Author.
New Medical Discoveries; with a Defence of the Linnæan Doctrine, and a Translation of Linnæus's Vegetable Materia Medica. By Charles Whitlaw. 8vo. Lond. 1829	The Author.
On the Causes and Effects of Inflammation, Fever, Cancer, Scrofula, and Nervous Affections; with Observations on Linnæus's Classification of Diseases. By the same. 8vo. Lond. 1831	The same.
Restorative for the rapidly declining Prosperity of the British Empire. (Anonymous.) 8vo. Lond.	Mr. George Whitley.
Observations on the Advantages of Joint-Stock Banks. (Anonymous.) 8vo. Cardiff. 1835	The Author.
Paris.—Bulletin des Séances de la Société Royale et Centrale d'Agriculture de Paris: Compte Rendu Mensuel, rédigé par M. Soulange Bodin. 12 livraisons (1837-8-9). 8vo. Paris, 1837-9	The Society.
Nantes.—Société Royale Académique de Nantes, et du Département de la Loire-Inférieur. Séance Extraordinaire, du 14 Mai, 1839.—Aperçus Statistiques. 8vo. Nantes, 1839	Sir John Herschel, Bart.
La Propagateur de l'Industrie de la Soie en France. Tome I. Premier Cahier. 8vo. Rodez. 1838	M. Amans Carrier.
Monographie des Céréales de la Suisse. Par N. C. Seringe. 12mo. Berne. 1819	The Author.
Catalogue Raisonné d'un Etablissement pour la Propagation du Mûrier. 8vo. Montbrison. 1838	M. Lebon.
Réglement du Comice Agricole du Mans. 12mo. Mans. 1838	The Association.
The Cultivator: a monthly publication, devoted to Agriculture. Conducted by J. Buel, of Albany. Vol. V. and No. 1 of Vol. VI. Folio. New York, 1838-9	Francis Rotch, Esq.
Two Lithographic Prints of the Society's Dining-Room and Show-Yard at Oxford	Messrs. Dewe, of Oxford.

LIST OF GOVERNORS.

[Life-Governors are distinguished by a mark thus †.]

Names.	Town Residence.	Country Residence.
Abingdon, Earl of	Clarendon Hotel	Wytham Abbey, near Oxford
†Acland, Sir T. D. Bt., M.P., F.R.S.	10, Upp. Harley-st.	Killerton Park, Collumpton, Devon.
Adeane, Henry John		Babraham House, Cambridge
Alston, Rowland, M.P.	48, Harley-street	Pishiobury, Sawbridgeworth, Herts.
Alston, R. Gardiner	48, Harley-street	Pishiobury, Sawbridgeworth, Herts.
Amherst, Earl	66, Grosvenor-st.	Montreal, Seven Oaks, Kent.
†Angerstein, John	23, St. James's-sq.	Weeting Hall, Brandon Ferry, Norfolk
Antrobus, Sir Edmund, Bart.	146, Piccadilly	Amesbury Abbey, Salisbury, Wilts.
†Arcedeckne, Andrew	1, Grosvenor-sq	Glevering Hall, Wickham Market, Suffk.
†Astley, Sir Jacob Henry, Bart.	7, Cavendish-sq.	Melton Park, East Dereham, Norfolk
Bagge, William, M.P.	Carlton-club	Stradset Hall, Downham Market, Norfk.
Baker, T. J. Lloyd		Hardwicke Court, Gloucester
†Barclay, Charles	43, Grosvenor-pl.	Bury Hill, Dorking, Surrey
†Barclay, David	8, Belgrave-square	Eastwick Park, Leatherhead, Surrey
†Baring, Hon. William B., M.P.	12, Gt. Stanhope-st.	
Baring, Sir Thomas, Bart.	21, Devonshire-pl.	Stratton Park, Winchester, Hants.
†Barker, John Raymond		Fairford Park, Fairford, Glouc.
Barker, Thomas Raymond		Hambleden, Henley-on-Thames, Oxon.
†Barneby, John, M.P.	34, Portman-sq.	Brockhampton House, Bromyard, Heref.
Bassett, John	12, Upp. Brook-st.	
†Beach, William		
Beaufort, Duke of	22, Arlington-st.	Badminton, Cirencester, Glouc.
Bedford, Duke of	6, Belgrave-square.	The Abbey, Woburn, Beds.
Benett, John, M.P.	Limmer's Hotel	Pyt House, Hindon, Wilts.
Bevell, J.		
Bisshopp, James		West Bury, Arundel, Sussex
Blachford, Fitz Roy		Osborn, Cowes, Isle of Wight, Hants.
Blake, William, F.R.S.	62, Portland-place	Danesbury, Welwyn, near Hertford
†Blanshard, Henry	37, Gt. Ormond-st.	Kirby-in-le-Soken, Manningtree, Essex
Blount, William	12, Cumberland-st.	
Bonsor, Joseph		Polesden, Great Bookham, Surrey
Boucher, John George		Shadfield, near Wickham, Hants.
†Bowes, John, M.P.	26, Charles-street	Streatham Castle, Staindrop, Durham
Bowles, J. S.		Milton Hill, Abingdon, Berks.
Bramston, Thomas Wm., M.P.	11, Hereford-street	Skreens, Chelmsford, Essex
Braybrooke, Lord	10, NwBurlingtn-st	Audley-End, Newport, Essex
Bridport, Lord	12, Wimpole-st.	Cricket Lodge, Chard, Somersetshire
†Brooke, Peter Langford		Mere Hall, Nether Knutsford, Cheshire
Bruges, Wm. Heald L., M.P.	3, Suffolk-street.	Seend Lodge, Melksham, Wilts.
Buckingham, Duke of	Pall Mall	Stowe Park, near Buckingham
†Buller, Edward, M.P.	5, Suffolk-place	Dilhorne Hall, Cheadle, Staffs.
Buller, T. Wentw. Capt. R.N.	37, Bryanston-sq	
Bulteel, John C.	9, Grafton-street	Fleet House, Yealmpton, Devon.
†Bunbury, Sir Henry Ed., Bart.		Barton Hall, Bury St. Edmund's, Suffk.
Burdett, Sir F., Bart., M.P.	25, St. James's-pl.	Foremark, Derby

Names.	Town Residence.	Country Residence.
Burlington, Earl of, F.R.S.	10, Belgrave-square	Holker Hall, Milnthorpe, Westmoreland
Burrell, Sir C. M., Bart., M.P.	5, Richmond-ter.	Knep Castle, Horsham, Sussex
†Cambridge, His Royal Highness The Duke of	Cambridge-House, Piccadilly	Kew Palace, Surrey
†Cavendish, Hon. C. C., M.P.	Burlington-ho., do.	Latimers, Chesham, Bucks.
Cayley, Sir George, Bart.	48, Albemarle-st.	High Hall, Brompton, Pickering, Yorks.
Challoner, Colonel C. Bisse	29, Portman-square	Portnall Park, Virginia Water, Surrey
Cichester, Earl of	17, Stratton-street.	Stanmer Park, Lewes, Sussex
Chichester, Sir Arthur, Bart.		Youlstone, Barnstable, Devon.
†Childers, Jno. Walbanke, M.P.	Carlton Hotel	Cantley Hall, Doncaster, Yorkshire
†Christopher, Robt. Adam, M.P.	97, Eaton-place	Bloxholme Hall, Sleaford, Lincl.
Clifford, Hon. Charles Thomas	3, Vere-street	Irnham Hall, Coltersworth, Lincl.
Clive, Lt.-Col. Ed. Bolton, M.P.	18, Grafton-st.	Whitfield House, near Hereford
†Clive, Hon. Robt. Henry, M.P.	53, LwGrosvenor-st	Oakley Park, Ludlow, Salop.
Cook, William	22, St. Paul'sCh.-yd	Clapham Rise, Surrey
†Copeland, Alderman, M.P.	37, Linc.-inn-fields	The Poplars, Leyton, Essex
Cotes, John		Woodcote, Shiffnal, Salop.
Crawley, Samuel, M.P.	59, Portland-place	Stockwood House, Luton, Beds.
Crompton, Sir S., Bart., M.P.	20, Suffolk-street	Woodend, Thirsk, Yorks.
Crowdy, James		Highworth, Wilts.
Curteis, Edward Barrett		Windmill Hill, Rye, Sussex
Curtis, W.		
Dacre, Lord	2, Chesterfield-st.	The Hoo, near Welwyn, Herts
†Davenport, E. D.		Calveley, Tarporley, Cheshire
De Beauvoir, R. B.		Englefield House, Reading, Berks.
Denison, Wm. Joseph, M.P.	90, Pall-mall	Denbies, Dorking, Surrey
Denison, J. Evelyn		Assington, Tuxford, Notts.
Dickinson, Francis Henry	8, Upp. Harley-st.	King's Weston, Somerton, Somerset
Downshire, Marquess of	21, Hanover-sq.	East Hempstead Park, Bracknell, Berks
Drummond, George	11, Wilton-crescent	
Drummond, A. M.	Charing Cross	Tile House, Denham, Bucks.
Drummond, Charles	24, Grosvenor-pl.	Bower Hall, Haver Hill, Suffolk
Duffield, Thomas, M.P.	University Club	Marcham Park, Abingdon, Berks.
Dugdale, Wm. Stratford, M.P.	50, Berkeley-sq.	Blythe Hall, Coleshill, Warwickshire
Duncannon, Viscount	3, Cavendish-sq.	Roehampton, Surrey
Duncombe, Hon. Wm., M.P.	23, Cavendish-sq.	Hooton Pagnell, Doncaster, Yorks.
†Durham, Earl of	13, Cleveland-row	Lambton Castle, Durham
†Egerton, T. Wilbraham	7, St. James's-sq.	Tatton Park, Knutsford, Cheshire
Eliot, Lord, M.P.	47, Dover-street	Port Eliot, St. Germains, Cornwall
Essex, Earl of	9, Belgrave-square	Cassiobury Park, Watford, Herts.
Estcourt, Thos. H. S. B., M.P.	58, LwGrosvenor-st	New Park, Devizes, Wilts.
Estcourt, T. G. B., M.P.	41, Dover-street	Estcourt, Tetbury, Glouc.
†Etwall, Ralph, M.P.	Oxf. & Camb. Club	Andover, Hants.
Euston, Earl of, M.P.	7, Grosvenor-place	Salcey Forest, Northampton
Evans, William, M.P.	8, Knightsbrdg-ter.	Allestree Hall, near Derby
†Exeter, Marquess of	7, Albemarle-st.	Burghley House, Stamford, Linc.
†Eyre, Charles		Welford House, near Newbury, Berks.
Falmouth, Earl of	2, St. James's-sq.	Tregothnan, Truro, Cornwall
Farquharson, J. J.		Langton, Blandford, Dorset.
Fawkes, T. Hawkesworth		Farnley Hall, Otley, Yorkshire
Fellowes, Capt. Edward, M.P.	15, LwrBerkeley-st	Ramsey Abbey, Huntingdon
†Fitzwilliam, Earl, F.R.S.	Mortimer House	Milton, Peterborough, Northampton.
Flounders, Benjamin		Yarm, Yorkshire
Foley, J. H. H.		Prestend, near Droitwich, Chesh.
Fortescue, Lord, F.R.S.		Dublin Castle, Ireland
Freeman, W. Peere Williams.		Fawley Court, Henley-on-Thames, Oxon.

Names.	Town Residence.	Country Residence.
Gibbs, Humphry	24, Half Moon-st.	Ampthill, Beds.
Gillies, Robert Maule . . .	Corn Exchange .	
Gooch, Sir Thomas S., Bart. .		Benacre Hall, Wrentham, Suffolk
Gordon, Robert, M.P. . . .	29, Dover-street .	Kemble Ho., near Cirencester, Glouc.
Grafton, Duke of	47, Clarges-street .	Euston Hall, Thetford, Norfolk
†Graham, Sir J. R., Bart., M.P.	46, Grosvenor-pl. .	Netherby, near Longtown, Cumberland
Greathead, Edward . . .	44, St. James's-pl.	Udding, nr. Ringwood, Hants.
Guest, Sir J. J., Bt., M.P., F.R.S.	13, Grosvenor-sq. .	Dowlais Ho., Merthyr-Tydvil, Glamrg.
Guise, Sir John W., Bart. .		Rendcombe Park, Cirencester, Glouc.
Hale, Robert Blagden, M.P. .	15, Bolton-st. . .	Alderley Park, near Wootton, Glouc.
†Handley, Henry, M.P. . .	30, Pall Mall . .	Culverthorpe Hall, Sleaford, Lincolnsh.
Handley, W. F.	. .	Newark-upon-Trent, Notts.
†Harcourt, George Simon, M.P.	Carlton Club . .	Ankerwycke House, Staines, Bucks.
Harland, Wm. Charles, M.P.	3, Chesterfield-st.	Sutton Hall, Easingwold, Yorks.
Hartopp, Sir Edmd. C., Bart.	169, New Bond-st.	Doe Bank, Sutton Colefield, Warw.
Hatherton, Lord	45, Grosvenor-pl. .	Teddesley Hall, Penkridge, Staffs.
Hayter, W. Goodenough, M.P.	11, Hyde Park ter.	Stoberry Park, Wells, Somerset.
Heathcoat, John, M.P. . .	6, Suffolk-street .	Bolham, Tiverton, Devon.
Heathcote, Gilbert J., M.P. .	Burlington Hotel	Stocken Hall, Grantham, Linc.
Heathcote, Sir W., Bart., M.P.	26, St. James's st.	Hursley Park, Winchester, Hants.
†Heneage, George Fieschi .	. .	Hainton Hall, Wragby, Linc.
†Herbert, Hon. Sydney, M.P. .	1, Grafton-street .	Wilton House, Salisbury
Hervey, William	. .	Bradwell Grove, Burford, Oxon.
Hewett, W. H.		
†Hill, Sir Rowland Bart., M.P.	Limmer's Hotel .	Hawkestone Hall, Whitchurch, Salop.
Hippisley, Henry		Lambourne Place, nr. Hungerford, Berks
Hodges, Thomas Law, M.P. .	16, Suffolk-street .	Hempsted Park, Cranbrook, Kent
†Holford, R. S.	43, Grosvenor-sq.	Weston Birt House, Tetbury, Glouc.
Holland, Edward	. .	Dumbleton Hall, Evesham, Worc.
Hope, Henry Thomas, M.P. .	1, Mansfield-st. .	The Deepdene, Dorking, Surrey.
Houblon, John Archer . .	10, Cumberland-pl.	Hallingbury Place, Bishop's Stortford.
†Howick, Viscount, M.P. . .	16, Whitehall-place	Howick House, Alnwick, Northumb.
Hulse, Sir Charles, Bart . .	. .	Breamore Ho., Fordingbridge, Hants.
†Hulse, Lieut.-Colonel . . .	. .	Breamore Ho., Fordingbridge, Hants.
Huntingfield, Lord . . .	. .	Heaveningham Hall, Yoxford, Suff.
†Huntingtower, Lord . . .	. .	Buckminster Park, Colsterworth, Linc.
Hurst, Robert Henry, M.P. .	68, St. James's-st.	Nuthurst Lodge, Horsham, Sussex
Hyett, W. H.	. .	Painswick House, Stroud, Glouc.
†Ilchester, Earl of	31, Old Burlngtn-st	Melbury House, Sherborne, Dorset.
Johnstone, Sir John V. B., Bt.	27, Grosvenor-sq.	Hackness, Scarborough, Yorkshire
Jones, Rev. J. P.	. .	Elm Green, Cirencester, Glouc.
Keene, Rev. C. Edmund . .	. .	Swincombe House, Wallingford, Berks.
Kensington, Lord	2, Carlton Ho. ter.	Heydon Hall, Reepham, Norfolk
†Kerrison, Lt.Gen.Sir E., Bt.M.P.	13, Gt. Stanhope-st.	Oakley Park, Eye, Suffolk
Kenyon, Lord	9, Portman-square	Gredington Hall, Whitchurch, Flints.
Knatchbull, Sir E., Bart., M.P.	71, Lower Grosv.-st.	Mersham Hatch, Ashford, Kent
Labouchere, Henry, M.P. .	27, Belgrave-sq. .	Stowey, Somersetshire
Lainson, Alderman John . .	59, Euston-square	
Langston, J. Haughton . .	143, Piccadilly .	Sarsden Ho., Chipping Norton, Oxon.
Lansdowne, Marquess of, F.R.S.	Berkeley-square .	Bowood Park, Calne, Wilts.
†Lawley, Sir Francis, Bart. .	18, Grosvenor-sq. .	Middleton Hall, Fazeley, Staffs.
†Lefevre, Charles Shaw, M.P. .	Eaton-square . .	Heckfield Pl., Hartford Bridge, Hants.
Leigh, Lord	7, Park-crescent .	Stoneleigh Abbey, Kenilworth, Warks.
Ley, John Henry	4, Richmond-ter.	Trehill, Exeter
Liverpool, Earl of . . .	Whitehall . . .	Pitchford Hall, Shrewsbury, Salop

Names.	Town Residence.	Country Residence.
†Long, Walter, M.P. . . .	29, Hill-street .	Rood Ashton, Trowbridge, Wilts.
Lovelace, Earl of	10, St. James's-sq.	Oakham Park, Ripley, Surrey
Macclesfield, Earl of, F.R.S. .	9, Conduit-street	Sherborne Castle, Tetsworth, Oxon .
Maitland, Eben. Fuller, F.R.S.	3, Bryanstone-sq.	Henley-on-Thames, Oxon .
Maitland, W. Whitaker . .	11, Gloucester-ter.	.
Mason, W. W.	. .	Linton
Maclean, Donald, M.P. . .	24, Berkeley-sq.	King's StanleyHouse, Frocester, Dursley
Melbourne, Viscount . . .	39, South-street	Brocket Hall, Welwyn, Herts.
†Miles, Philip J.	7, Hamilton-place	Leigh Court, Bristol
†Miles, William, M.P. . . .	Ditto	King's Weston, Bristol
†Mordaunt, Sir J., Bart., M.P..	4, Eaton-place	Walton Hall, Stratford-on-Avon, Warw.
†Moreton, Lord	2, Seymour-place	Woodchester Park, Stroud
Morgan, Sir Chas.Gould, Bart.	70, Pall Mall	Tredegar, Newport, Monmouthshire
Morland, T. T.	. .	Sheepstead, Abingdon, Berks.
†Morrison, James	57, Upp. Harley-st.	Fonthill Abbey, Hindon, Wilts.
Morton, John	. .	Chester Hill, Stroud, Glouc.
Moseley, John	. .	Glenham, Wickham Market, Suffolk
Mostyn, Lord	9, Lwr Seymour-st.	Mostyn Hall, Holywell, Flintshire
Mostyn, Hon. Ed. M. Lloyd .	9, Gt. Seymour-st.	Mostyn Hall, Holywell, Flintshire
Naper, J. W. Lennox . .	. .	Lough Crew, Oldcastle, Ireland
†Neeld, Joseph, M.P. . . .	6, Grosvenor-sq. .	Grittleton House, Chippenham, Wilts.
Noel, Hon. Charles George .	11, Chandos-st, Cav.	Exton Park, Stamford, Linc.
Norfolk, Duke of, F.R.S. .	21, St. James's-sq.	Arundel Castle, Sussex
Northampton, Marq. of, P.R.S.	145, Piccadilly .	Castle Ashby, Northampton
†Northumberland, Duke of, FRS.	Northumberlnd-ho	Alnwick Castle, Northumberland
Nurse, Wm. Mountford . .	5, Langham-pl. .	Great Cell Barns, St. Albans
Palmer, Robert, M.P. . . .	6, Charles-street. .	Holme Park, Reading, Berks.
Patten, John Wilson, M.P. .	24, Hill-street. .	Bank Hall, Warrington, Lanc.
†Peel, Sir R., Bart., M.P., F.R.S.	Whitehall Gardens	Drayton Manor House, Fazeley, Staffs.
Pegus, Rev. P. M. . . .	. .	Uffington Hall, Stamford, Lincl.
†Pendarves, E.W., M.P., F.R.S.	36, Eaton-place .	Pendarves House, Truro, Cornwall
Penruddocke, Jno. Hungerford	35, Curzon-street	Compton Park, Salisbury, Wilts.
†Percival, John	. .	Ryde, Isle of Wight
Philips, Mark, M.P. . . .	6, Vigo-street . .	The Park, Manchester
Plowden, William	. .	Plowden Castle, Ludlow, Salop.
†Popham, General	. .	Littlecot, Hungerford, Wilts.
†Portman, Lord	18, Eaton-square	Bryanston House, Blandford, Dorset.
Price, Sir Robert, Bart., M.P.	11, Stratton-street	Foxley Hall, near Hereford
†Pusey, Philip, M.P., F.R.S. .	35, Grosvenor-sq.	Pusey House, nr. Faringdon, Berkshire
Pym, Francis	35, Clarges-street	The Hasells, Biggleswade, Beds.
†Radnor, Earl of	52, Lwr Grosvr-st.	Longford Castle, Salisbury, Wilts.
Rayleigh, Lord		Terling Place, Witham, Essex
†Richmond, Duke of . . .	51, Portland-place	Goodwood Park, Chichester, Sussex
Ripon, Earl of, F.R.S. . . .	1, Carlton Gardens	Nocton Hall, Lincoln
Rodd, Rev. Edward, D.D. .	. .	Trebartha Hall, Launceston, Cornwall
Rogerson, Joseph		
Rosebery, Earl of, F.R.S. .	139, Piccadilly .	Warren Wood, Hatfield, Hertfordshire
†Rutland, Duke of	7, Bolton-street .	Belvoir Castle, Grantham, Leicestershire
Salisbury, Marquess of . .	20, Arlington-st. .	Hatfield House, Herts.
†Sanford, Ed. A., M.P., F.R.S.	21, Queen-st, Mayfr	Nynehead Court, Wellington, Somerset.
Scarborough, Earl of . . .	41, South-st. . .	Sandbeck Castle, Bawtry, Yorkshire
Seymour, Henry	39, Upp. Grosvr-st.	Knoyle House, Hindon, Wilts.
Shaw, William	7, King's-rd, Bdf-rw	
Sheffield, Earl of	20, Portland-place	Sheffield Park, Uckfield, Sussex
Sherborne, Lord	17, Hyde Park-st.	Sherborne House, Northleach, Glouc.

Names.	Town Residence.	Country Residence.
Sheridan, Richard Brinsley .	9, Grosvenor-sq. .	Frampton House, Dorchester, Dorset.
Shuckburgh, Sir F., Bart. FRS.	Hans-pl., Chelsea	Shuckburgh Park, Southam, Warwicksh.
†Slaney, Robt. Aglionby, M.P..	17, Suffolk-street	Walford Manor, Shrewsbury
Smith, Jeremiah	. .	Cadbar, Rye, Sussex
†Smith, John Abel, M.P. . .	47, Belgrave-sq.	Sacombe Park, Ware, Herts.
Smith, William	. .	Prae Hill, St. Albans, ditto
†Sondes, Lord	17, St. James's-pl.	Rockingham Castle, Northamptonshire
†Spencer, Earl	27, St. James's-pl.	Althorp Park, near Northampton
Stanhope, John Spencer . .	. .	Cannon Hall, Barnsley, Yorkshire
†Stanley, Lord, M.P. . . .	8, St. James's-sq. .	Balley Kisteen, Tipperary, Ireland
Stansfield, Wm. R. C., M.P.	11, Clarges-street .	Esholt Hall, Bradford, Yorkshire
Steel, Sir Robert	15, Fludyer-street	
Stonor, Thomas	3, Tilney-street .	Stonor Park, Henley-on-Thames, Oxon.
Stracey, Sir Edw. Bart., F.R.S.	. .	Rackheath Hall, Norwich
†Stradbroke, Earl of . . .	18, Queen-street .	Henham Park, Southwold, Suffolk
†Strutt, Edward, M.P. . . .	42, South-street .	St. Helen's, near Derby
Stuckey, Vincent	126, Sloane-street	Hill House, Langport, Somersetshire
Sumner, Col. Geo. Holme, FRS.	. .	Hatchland Park, Guildford, Surrey
†Sutherland, Duke of . . .	Stafford House .	Trentham Park, Newcastle-under-Lyne
†Sutton, Sir Richard, Bart. .	. .	Norwood Park, Southwell, Notts.
†Talbot, Earl	33, Gt. George-st.	Ingestre Hall, near Stafford
Thomas, Inigo	. .	Ratton Park, Eastbourne, Sussex
Thorald, Sir John Chas., Bart.	. .	Syston Park, Grantham, Lincolnshire
Tower, Christopher Thomas .	. .	Weald Hall, Brentwood, Essex
†Townley, Rich. Greaves, M.P.	Limmer's Hotel .	Fulbourn House, near Cambridge
Tremayne, John Hearle . .	. .	Heligan, Grampound, Cornwall
Trotter, John	. .	Horton Place, near Epsom, Surrey
Vansittart, Henry	. .	Kirkleatham, Guisborough, Yorkshire
Vavasour, Hon. Sir E. M., Bart.	. .	Haslewood Hall, Tadcaster, Yorkshire
Villebois, F.	. .	Adderbury Lodge, Kingsclere, Hants.
†Wakeman, Sir Offley P., Bart.	3, Princ.-st, Han-sq	Perdiswell Park, Worcester
Wall, Ch. Baring. M.P., F.R.S.	44, Berkeley-sq. .	Norman Court, Stockbridge, Hants.
Watson, Hon. Richard . .	36, Davies-street .	Rockingham Castle, Northampton
Welby, Sir Wm. Earle, Bart.	8, Upp. Belgrave-st.	Denton House, Grantham, Lincolnshire
†Wellington, Duke of . . .	Apsley House . .	Strathfieldsaye, Hartford-bridge, Hants
†Wenlock, Lord	29, Berkeley-sq. .	Escrick Hall, Selby, Yorkshire
†Westminster, Marquess of .	33, Upp. Grosv.-st.	Eaton Hall, Chester
†Whitbread, William Henry .	76, Eaton-square .	South Hill House, near Bedford
Wilbraham, G., M.P., F.R.S.	23, Brook-street .	Delamere House, Northwich, Cheshire
Williams, William, M.P. . .	31, Pall-Mall . .	
Williams, Rev. E. H. G. . .	. .	Marlborough, Wilts.
Wilmot, E. W.	. .	Rufford, Ollerton, Notts.
Wills, B.	. .	Camberwell, Surrey
†Wilson, Henry	. .	Stowlangtoft Hall, Suffolk
Wilshere, William, M.P. . .	2, I, Albany . .	Walsworth Hermitage, Hitchin, Herts.
Wingate, W. B.	.	Hareby, Bolingbroke, Lincolnshire
Wood, Col. Thomas, M.P. .	4, Cavendish-sq. .	Littleton House, Staines, Middlesex
†Worsley, Lord, M.P. . . .	12, Up. Belgrave-st.	Manby Hall, Glanford Bridge, Linc.
Wright, John	6, Henrietta-st. C G	Belsize Park, Hampstead, Middlesex
Wroughton, Bartholomew .	. .	Woolley Park, Lambourn, Berks.
†Yarborough, Earl of . . .	17, Arlington-st. .	Brocklesby Hall, Glanford Bridge, Linc.
Yorke, W.		
Youatt, William	. .	11, Adams'-terrace, Camden Town

LIST OF MEMBERS.

[Life-Members are distinguished by a mark thus †.]

Names.	Town Residence.	Country Residence.
Abbott, Thomas		Aylesford, Kent
Ackland, Robert Fines		Boulston, Haverford West, Pembroksh.
Acland, Thomas Dyke, M.P.	92, Jermyn-street	Holnicote, Minehead, Somersetshire
Acome, John		Kidlington, Woodstock, Oxon.
Ade, Rev. John		Wensley Rectory, Bedale, Yorkshire
Adey, William		Chorley, Lichfield, Staffs.
Agar, Hon. G. C.		Woodstock, Oxon.
Aitken —		Deeping Fen, Spalding, Lincolnshire
Aldbright, N.		Charltsnoy, Banbury, Berks.
Alderman, Charles		Kentbury, Newbury, Berks.
Aldridge, Robert		St. Leonard's Forest, Horsham, Sussex
Aldworth, W., Jun.		Frilford, Abingdon, Berks.
Aldworth, J.		Frilford, Abingdon, Berks.
Alexander, Wm. Maxwell	22, Upp. Grosv.-st.	Southbar, Renfrewshire
Allen, John		Liskeard, Cornwall
Allen, W.		Great Hendred, Wantage, Berks.
Allin, Richard		Little Moor, Oxford
Allin, Richard, Jun.		Sandford, Oxford
Allix, Charles		Willoughby, Alford, Lincolnshire
Allpress, R. W.		Burleigh Hill, St. Ives, Hants.
Almack, John, Jun.		Leckonfield Park, Beverley, Yorkshire
Almack, Thomas		Bishop Burton, Beverley, ditto
Almack, Barugh	10, Whitehall-pl.	
Alywin, William		Thatcham, Newbury, Berks.
Ambrose, ——		
Anderson, Robert		Cirencester, Gloucestershire
Anderson, William		Oakley, Bedford
Andrews, Edwin		Shroton, Devonshire
Annesley, Arthur	89, Eaton-square	Bletchington Park, Woodstock, Oxon.
Ansell, William		Wantage, Berks.
Appleby, L.		
Arbuthnot, Rt. Hon. Charles		Woodford Lodge, Thrapston, Northamp.
†Archbold, Robert, M.P.	55, Jermyn-street	David's Town, Castledermot, Ireland
Archer, William		Horningsham, Warminster, Wilts.
Arkwright, Charles		Dunstall Lodge, Burton-upon-Trent
Arkwright, Rev. Joseph		Mark Hall, Harlow, Essex
Arnatt, Jonathan		Leer, Witney, Oxon.
Arnitt, G.		
Arnot, David Gale		Wyfold Court, Henley-upon-Thames
Arnott, George		Tingewick, Buckingham
Ashdown, John		Uppington, Shrewsbury, Salop.
Ashurst, William Henry		Waterstock House, Wheatley, Oxon.
Ashurst, W. H., Jun.		Waterstock House, Wheatley, Oxon.
Astbury, William	62, High-st, Cam.T	
Aston, Samuel		Compton House, Newcut, Gloucester
Atkins, E. Martin		Kingston-Lisle, Wantage, Berks.
Atterbury, H. S.		Woburn, Bedfordshire

Names.	Town Residence.	Country Residence.
Austen, Colonel	. .	Seven Oaks, Kent
Austen, Gardner	. .	Patrick's Bourne, Canterbury, Kent
Austin, L. S.	. .	The Warren, Wootton-under-Edge
Aylesford, Earl of	50, Grosvenor-st.	Parkington Hall, Coventry, Warwicksh.
Bacon, James	. .	Pluckley, Charing, Kent
Badcock, Benjamin	. .	Broad-street, Oxford
Badcock, John.	. .	Radley, Abingdon, Berks.
Baden, Andrew	. .	Long-street, Ludgershall, Wilts.
Badham, G. D.	. .	Waldringfield, Woodbridge, Suffolk
Bailey, Charles	. .	Abingdon, Berks.
Bailey, William James	. .	Shenley House, Stony Stratford, Bucks
Bailey, J.	. .	Shirley House, Stony Stratford, Bucks
Bailey, William	. .	Hursley, Winchester, Hants.
Baillie, W. H.	33, Cavendish-sq.	Duntisbourne, Cirencester, Gloucestersh.
Bailward, John	. .	Horsington, Wincanton, Somersetshire
Baines, John	8, Cleveland-row .	Goosnargh, Preston, Lancashire
Baker, Robert	. .	Writtle, Chelmsford, Essex
Baker, Richard W.	. .	Cottesmore, Oakham, Rutlandshire
Baker, Sir Edw. Baker, Bart.	. .	Ranston House, Blandford, Dorset.
Baker, T. Barwick	. .	Hardwick Court, Gloucester
Baker, Rev. Richard Hy.	. .	Linchmere, Hazlemere, Sussex
Baker, Thomas	. .	Little-Rollright, Chipping-Norton, Oxon
Ballard, Rev. J.	. .	Cropredy, Banbury, Oxon.
Banger, Thomas	. .	Piddletown, Dorchester, Dorset
Bannerman, A.	. .	Chorley, Lancaster
Banting, James	. .	Oxford
Barber, Richard	. .	Charlton, Tetbury, Gloucestershire
Barclay, Wm.	. .	Haseley, Warwick
Barclay, J. P.	. .	Haseley, Warwick
Barker, George Raymond	. .	Fairford Park, Fairford, Gloucestersh.
Barlow, Rev. G. F.	. .	Burgh, Woodbridge, Suffolk
Barnard, F.	. .	Wantage, Berks.
Barnard, Richard	. .	Pusey, near Faringdon, Berks.
†Barneby, William	. .	Chater Park, Bromyard, Herefordshire
Barnett, Charles	. .	Stratton Park, Biggleswade, Beds.
Barnett, Joseph	. .	Remenham Hill, Henley-on-Thames
Barrett, Thomas	. .	Tattersfield Hall, Westerham, Kent
Barrington, Viscount, M. P.	34, South-street .	Beckett House, Faringdon, Berks.
Barter, Rev. C.	. .	Sarsden, Chipping-Norton, Oxon.
Bartlett, William	. .	Whitcombe, Dorchester, Dorset.
Bartlett, Isaac	. .	Haws, Brackley, Northamptonshire
Bartlett, John	. .	Haws, Brackley, Northamptonshire
Barton, John	. .	Threxton, Watton, Norfolk
Barton, John	. .	Lee, Havant, Hampshire
Barton, Thomas	. .	
Barton, Nathaniel	. .	Corsley House, Warminster, Wilts.
Bates, Thomas	. .	Kirkleavington, Yarm, Yorks.
Bates, Thomas Ellis	. .	Fittleton, Amesbury, Wilts.
Bathurst, Earl	8, John-st, Berk.-sq	Oakley Park, Cirencester, Glouc.
Bathurst, Hon. William L.	7, Half-moon-st.	
Batt, E. A.	. .	Witney, Oxfordshire
Bawldry, Charles	. .	Ascott, Woodbridge, Suffolk
Bawtree, John	. .	Sayer, Colchester, Essex
Baxter, Robert	. .	Doncaster, Yorkshire
Bayley, C. B.		
Bayne, William	. .	Oxford
Beach, Sir Mich. Hicks, Bart.	20, Portman-sq.	Williamstrip Park, Fairford, Gloucest.
Beach, John	. .	Redmarley, Gloucester.

Names.	Town Residence.	Country Residence.
Beadel, James	. .	Witham, Essex
Beasley, John	. .	Brampton, Northampton
Beaufort, Henry	. .	Holme, Biggleswade, Beds.
Beaumont, E. B.	. .	Firmingley, Bawtry, Notts.
Beck, William	. .	Mileham, East Dereham, Norfolk
Beck, Edward	. .	Harpley, Castle Rising, Norfolk
Beckett, W.	. .	Kirkstall Grange, Leeds, Yorkshire
Bedford, John	. .	Boughton House, Lincolnshire
Beldam, Valentine	. .	Royston, Herts.
Beman, Robert	. .	Donnington, Moreton-in-Marsh, Glouc.
Bennett, James	. .	Cadbury House, Castle Carey, Somers.
Bennett, Joseph	. .	Tempsford, Biggleswade, Beds.
Bennett, Samuel	. .	Bickerings Park, Woburn, Beds.
Bennett, Thomas	. .	Woburn, Beds.
Bennett, Thomas	. .	Chaddlesworth, East Ilsley, Berks.
Bennett, William	. .	Lewsey, near Luton, Beds.
Bennett, W.	. .	Syde, Cirencester, Gloucestershire
†Benson, Rev. H. B.	. .	Utterby House, Louth, Lincoln.
Benson, John	. .	Tavistock, Devon.
Best, Rev. T.	. .	Kirby-on-Bain, Horncastle, Lincoln.
Bethell, Henry	. .	Enford, Pewsey, Wilts.
Bethune, Edward Drinkwater	80, Chester-square	
Bethune, Rev. G.	. .	Worth Rectory, Crawley, Cuckfield, Sus.
Bettridge, Henry	. .	East Hanney, Abingdon, Berks.
Bettridge, R. H.	. .	Milton Hill, Abingdon, Berks.
Bicheno, Jas. Ebenezer, F.R.S.	. .	Ty-Maen, Pyle, Glamorganshire
Bigg, Thomas	15, Crawford - st.	
Binnix, J. A.	. .	West Dean, Chichester, Sussex
Binns, Jonathan	. .	
Birch, George W.	. .	
Birks, John	. .	Herringfield
Birnie, J. B.	8, St. Martin's-pl.	
Birt, Jacob	12, Myddleton-sq.	
Bisshopp, John	. .	Westburton, Petworth, Sussex
Blackbourn, David	. .	Temple Brewer, Lincolnshire
Blackett, Henry	. .	Stockburn, Darlington, Durham
Blackford, Richard	. .	Malmesbury, Wilts.
Blagrove, Edward	. .	Magdalen College, Oxford
†Blair, John	18, Calthorpe - st.	Moseley Lodge, Welford
Blake, N.	. .	Stanton Harcourt, Salop
Bland, Dr.	. .	Grantham, Lincolnshire
Bland, William	. .	Hartlip, Sittingbourne, Kent
Blandy, Adam	. .	Kingston House, Abingdon, Berks.
Blandy, T.	. .	Kingston, Bagpuze, Berks
Blandford, Marquess of . .	5, York-st. St. Jas.'	Howbury, Beds.
Blexam W.		Modetonham
†Bliss, Rev. Philip, D.D. . .	. .	Oxford
Blyth, H. E.	. .	Burnham-Westgate, Norfolk
Boards, William	. .	Edmonton, Middlesex
Boby, Charles	. .	Finborough, Stowmarket, Suffolk
Bodley, John	. .	Stockley, Crediton, Devon.
Bolton, Lord	25, Berkeley-sq.	Hackwood Park, Basingstoke, Hants.
Booth, John	. .	Killerby, Catterick, Yorkshire
Boringdon, Viscount . . .	. .	Kentchurch, Kensington, Middlesex
†Botfield, Beriah	. .	Norton Hall, Daventry, Northamptonsh.
Botfield, Thomas	. .	Hopton Court, Cleobury-Mortimer, Salp.
Botfield, William	. .	Decken Hill, Shifnal, Salop
Botley, John	. .	Stockley, Crediton, Devon.
†Bourchier, Charles . . .	66, Wimpole-street	
Bourne, George	. .	Halton, Spilsby, Lincolnshire

Names.	Town Residence.	Country Residence.
Bouverie, Edward	. .	Delapre Abbey, Northampton
Bowley, David	. .	Cirencester, Gloucestershire
Bowley, E.	. .	Cirencester, Gloucestershire
Bowley, William	. .	Cirencester, Gloucestershire
Bowman, C.	. .	. . .
Boys, Henry	. .	Waldersham, Dover, Kent
Boys, R.	. .	Eastbourne, Sussex
Boys, Edward	. .	Alkerton, Banbury, Oxon
Bradley, Edward	. .	Traduff, Cowbridge, Glamorganshire
Brailsford, Thomas . . .	. .	Barkwith, Wragby, Lincolnshire
Braine, Robert	. .	Oxford
Braithwaite, Garnet . . .	. .	Plumtree Hall, Milnthorpe, Westmorld.
Brenner, W.	. .	
Brethingham, J. C. . . .	. .	Brockdish, Harleston, Norfolk
Bretull, R.	. .	Hales-Owen, Salop
Brewitt, Thomas	. .	Rayleigh, Essex
Breynton, John	. .	Haunch Hall, Lichfield, Staffordshire
Bridge, Thomas	. .	Buttsbury, Ingatestone, Essex
†Bright, J.	. .	Teddesley Pk. Farm, Penkridge, Staffs.
Bristow, S. E.	. .	Burthorp House, Newark, Notts.
Broadwood, J. S.	. .	Lyne, Dorking, Surrey
Bromhead, Benjamin . .	. .	Lincoln
Bromley, R. Maddox . . .	. .	Meopham, Rochester, Kent
Bromwell, Rev. R. . . .	. .	Pembroke College, Oxford
†Brooke, Sir Richard, Bart. .	. .	Norton Priory, Runcorn, Cheshire
Brooks, John	. .	Hatford, Faringdon, Berkshire
Brooks, T.	. .	Croxby, Cambridgeshire
Brooks, Bernard	. .	Lyford, Wantage, Berkshire
Brown, Charles	. .	Redbourn, St. Alban's, Hertfordshire
Brown, Francis	. .	Welbourne, Sleaford, Lincolnshire
Brown, George	. .	Avebury, Marlborough, Wiltshire
Brown, George	. .	Avebury, Marlborough, Wiltshire
Brown, J.	. .	Pamphill Ho., Wimborne Minster, Dors.
Brown, John	. .	Compton, Ibsley, Ringwood, Hants
†Brown, Rev. H.	. .	Burton, Sleaford, Lincolnshire
Brown, Rev. Robert . . .	. .	Kidlington, Woodstock, Oxon
Brown, T.	. .	. . . .
Brown, Thomas	. .	Bartenbury Ho., Cirencester, Glouces.
Brown, Thomas	. .	South Fairly, Wantage, Berkshire
Brown, William	. .	Lockinge, Wantage, Berkshire
Browne, W. R.	. .	Chilton
Browne, John	11, O. Cavendish-st	Chisledon, Swindon, Wiltshire
Browne, Rev. Robert . . .	. .	. . . .
Browning, Jonathan . . .	. .	Oxford
Brunner, William	. .	Oxford
Bryant, William	. .	Newmarket, Cambridgeshire
Bubb, Anthony	. .	Witcombe, Gloucestershire
Buckland, Rev. W., D.D., F.R.S.	. .	Christchurch, Oxford
Buckley, John	. .	Normanton Hill, Loughborough, Leic.
Budd, Captain H., R. N. . .	. .	Winterbourne Basset, Marlbro', Wilts.
Bulford, Thomas	. .	Studley, Oxford
†Buller, John	. .	Morsal, Looe, Cornwall
†Bullock, Ferdinand . . .	. .	East Challow, Wantage, Berkshire
Bulwer, William Lytton . .	. .	Heydon Hall, Reepham, Norfolk
Bunnett, Thomas	. .	. . .
Burd, Timotheus	. .	Whiston Priory, Salop.
Burder, D.	. .	Abingdon, Berkshire
Burford, Thomas	. .	. . . .
Burgess, Robert	. .	Winterbourne Bassett, Marlbro', Wilts.
Burke, French	84, Gower-st., B.sq.	. . . .

Names.	Town Residence.	Country Residence.
Burn, Ilderton	21, Connaught-sq.	
Burnand, William	. .	Norton, Chichester, Sussex
Burness, C.	. .	
Burrows, T., Jun.	. .	Haddington, Oxford
Burt, Thomas	. .	Iwerne, Blandford, Dorsetshire
Burt, William	. .	Witchampton, Wimborne-minster, Dst.
Burt, A.	. .	Witchampton, Wimborne-minster, Dst.
Burt, George	. .	Whitsbury, Wiltshire
Burton, Launcelot Archer	. .	Grove End House, St. John's Wood
Burtt, James	. .	Clenston
Bury, John W.	20, Devon.-st, Pt.-pl	
Butcher, W.	. .	Standish, Stroud, Gloucestershire
Butterfield, John	. .	Haws, Brackley, Northamptonshire
Cadle, Joseph	. .	Westbury-on-Severn, Gloucestershire
†Calcraft, John Hales, M.P.	12, Carlton-terrace	Corfe Castle, Dorset
†Caldecott, Thomas	. .	Rugby Lodge, Rugby, Warwickshire
Caldecote, R. M.	. .	Eastbourne, Sussex
Caley, Digby	. .	Ripon, Yorkshire
Calhoun, Walter F.	. .	Binderton, Midhurst, Sussex
Calthorp, Richard	. .	Swinehead Abbey, Boston, Lincolnshire
Calverley, Thomas	1, Regent-street	Ewell House, Ewell, Surrey
Calvert, John W., M.D.	11, Blandf.-pl.R.P.	
†Calvert, Frederick	. .	Claydon House, Winslow, Bucks.
Calvert, Edmund	. .	Hunsdon, Ware
Calvert, N.	. .	Hunsdon, Ware, Herts.
Cannon, J. S.	. .	Beckley, Oxford
Capel, William	. .	Grove, Stroud, Gloucestershire
Capper, Mrs.	. .	Hailsham House, Hailsham, Sussex
†Carew, W. H. Pole	. .	Antony House, Devonport, Devon.
Cary, Rev. H.	. .	Cowley House, near Oxford
Carnegie, Rev. J.	. .	Seaford, Sussex
Carrington, Geo., Jun.	. .	The Abbey, Great Missenden, Bucks.
Carrington, Lord	. .	The Abbey, High Wycombe, Bucks.
Carter, J. Thomas	. .	Hunstanton, Lynn, Norfolk
Carter, J. R.	. .	Spalding, Lincolnshire
†Cartwright, Thomas W.	. .	Ragnall Hall, Newton-on-Trent, Notts.
Casson, —	. .	Ditchley Park, near Woodstock, Oxon.
Castle, Benjamin	. .	Oxford
Castree, J.	. .	Gloucester
Catlin, Thomas W.	. .	Chillesford, Orford, Suffolk
†Cator, Rev. Thomas	. .	Skelbrooke Park, Doncaster, Yorksh.
Caudwell, William	. .	Drayton, Abingdon, Berks.
Cavendish, Hon. Geo. H., M.P.	. .	Ashford Hall, Bakewell, Derbyshire
Cayley, Ed. Stillingfleet, M.P.	. .	Wydale, Malton, Yorkshire
Chamberlain, H.	. .	Disford, Leicestershire
Champion, Thomas A.	. .	Sarr, near Canterbury, Kent
Chandler, Thomas	. .	Stockton-upon-Tees, Durham
Chapman, Thomas	. .	Stoneleigh, Coventry, Warwickshire
Chapman, Thomas	3, Arundel-st., Strd.	
Chapman, George	3, Arundel-st., Strd.	
Charge, Thomas	. .	Barton, Darlington, Durham
Charlton, J.	. .	
Chaundy, Richard	. .	Oxford
Chawner, Richard Croft	. .	Wall, Lichfield, Staffordshire
Cherry, George Henry	. .	Denford House, Burghfield, Reading
Chillingworth, William	. .	Cuddesden, Tetsworth, Oxon.
Chichester, J. P. Bruce, M.P.	24, Chester-st. Gr. pl	Arlington House, Barnstaple, Devon.
Chisman, John	. .	Stockton-upon-Tees, Durham
†Cholmeley, Sir Mont. J., Bart.	. .	Easton Hall, Coltersworth, Lincolnshire

Names.	Town Residence.	Country Residence.
Chrisp, Thomas	. .	Hawk Hill, Alnwick, Northumberland
Christie, Langham	. .	Preston Deanery, Hackleton, Northam.
†Chrystie, William	20, Chester-tr. R. pk	
Church, Robert	. .	Bishopstoke, Westbury, Wiltshire
Chute, W. Wiggett	. .	Pickenham Hall, Swaffham, Norfolk
Clark, Joseph	. .	Maidenhead, Berkshire
Clarke, C. J.	. .	Egham, Surrey
Clarke, Joseph, Jun.	. .	Ashby, Sleaford, Lincolnshire
Clarke, K.	35, Southampt.-bls.	
Clarke, Rev. C.	. .	Henstead, Beccles, Suffolk
Clarke, Rev. John	. .	Chertsey, Surrey
Clarke, Thos. E.	. .	Chard, Somersetshire
†Clay, William, M.P.	. .	Fullwell Lodge, Twickenham, Middlsx.
Clayden, John	. .	Littlebury, Saffron Walden, Essex
Clements, Viscount, M.P.	2, Grosvenor-sq.	Rynn, Mohill, Leitrim, Ireland
Clifton, Capt. T.		
Clinch, J. W.	. .	Witney, Oxfordshire
Clode, William	. .	Bakeham House, Egham, Surrey
Close, John	. .	Great Linford, Newport Pagnell, Bucks.
Clutton, Robert	. .	Hartswood, Reigate, Surrey
Clutton, John	8, Parliament-st.	
Cobb, Timothy Rhodes	. .	Steeple-Aston, Deddington, Oxon.
Codrington, O. Calley	. .	Wroughton, Swindon, Wiltshire
†Colebrooke, Sir Jas. E., Bart.	. .	Colebrooke Park, Tonbridge, Kent
Coles, James	. .	Stratton-Audley, Bicester, Oxon
Collett, Russell,	. .	The Jungle, near Lincoln
Collingwood, J. V.	. .	Abingdon, Berkshire
Collins, Rev. T. F.	. .	Betterton, Wantage, Berkshire
Colville, Frederick		
Colvin, B. B.	. .	Monkhams Hall, Waltham Abbey, Esx.
†Compton, Henry Combe, M.P.	16, Carlton Ho.-ter.	Minstead Manor Ho., Lyndhurst, Hants
Compton, Richard	. .	Eddington, Hungerford, Berks.
Connop, H., Jun.		
Cook, Rev. Joseph	. .	Thedingworth, Market Harbro', Nthmpt.
Cook, John	. .	Down-Ampney, Cirencester, Glouc.
Cook, T.	. .	Howthorp, Northampton
Cook, Rev. T. L. B.	. .	Oxford
Cooke, Layton	12, Pall Mall	
Cooke, Rev. T. L.	. .	Beckley, near Oxford
Cooling, John	. .	Lower Winchindon, Thame, Oxon.
Cooper, J. G.	. .	Blythburgh, Southwold, Suffolk
Cooper, Samuel	. .	Henley
Cooper, Thomas	. .	Norton, Seaford, Sussex
Cooper, W. D.	. .	Highgate
Copeland, Joseph	. .	Abingdon, Berkshire
Copeland, William	. .	Abingdon, Berkshire
Cormack, William	Covent Garden	
Cormack, William John	Covent Garden	
Cornish, Rev. J. J.	. .	Kenwyn, Truro, Cornwall
Corrance, Frederick	. .	Loudham Park, Woodbridge, Suffolk
Cother, William	. .	Middle Aston, Woodstock, Oxon.
Cottam, George	Winsley-st., Oxf.-s.	
Cotterell, Sir J. Geers, Bart.,	. .	Garnons, near Hereford
Cottingham, L. O.	. .	Reydon, Southwold, Suffolk
Courtney, W.	. .	Newton-Stacey, Whitchurch, Hants.
Coverdale, John	1, Field-ct. Gr's I.	Oak Lodge, Kilburn, Middlesex
Cowling, Charles	. .	Rye Farm, Oxfordshire
Coyney, W. Hill	. .	Weston Coyney, Lane End, Staffs.
Cozens, D. G.	. .	Bickenhall, Taunton, Somerset.
Cradock, Sheldon	. .	Hartforth Hall, Richmond, Yorkshire

Names.	Town Residence.	Country Residence.
Cragg, William	. .	Threckingham, Folkingham, Lincolns.
Cramp, John M.	. .	St. Peter's, Isle of Thanet, Kent
Cramp, John	. .	Garlinge, Margate, Kent
Cripps, Edward	. .	Cirencester, Gloucestershire
Cripps, Joseph, M.P. . . .	. .	Cirencester, Gloucestershire
Cripps, Thomas	. .	Oxford
Cripps, Raymond	. .	Cirencester, Gloucestershire
Crisp, Thomas	. .	Gedgrave Hall, Orford, Suffolk.
Croft, Sir John, Bart., F.R.S..	45, Brook-street .	Cowling Hall, Yorkshire
Crofton, Thomas	. .	Holywell, Durham
Crompton, John Bell . . .	. .	Milford, near Derby
Croome, James	. .	Acton Hall, Berkeley, Gloucestershire
Cross, W. J.		
Crouch, A. W.	. .	Ridgmount, Woburn, Bedfordshire
Crowdy, Richard	. .	Faringdon, Berkshire
Cubley, Samuel	. .	Quarrington, Sleaford, Lincolnshire
†Cure, Capel	2, Devonshire-pl.	Blake Hall, Ongar, Essex
Currie, Henry	. .	West Horsley Pk., Leatherhead, Surrey
Currie, Edmund	. .	Oakley House, Abingdon, Berkshire
Curteis, Herbert B. . . .	19, Bridge-st., Wstr	Peasemarsh, Rye, Sussex
Curtis, Adml. Sir Lucius, Bart.	. .	Gatcombe House, Portsmouth, Hants.
Dadds, John	. .	St. Nicholas, Thanet, Kent
Darlington, Earl of . . .	40, Upp. Brook-st.	Snettisham Hall, Lynn, Norfolk
Dashwood, Francis . . .	9, Seymore-place	Halcot, Bexley, Kent
Daubeny, Chas., M.D., F.R.S.	. .	Oxford University
Davey, William	. .	South Park, Headon, Hull
Davey, George	. .	Dorchester, near Benson, Oxfordshire
Davenport, George . . .	. .	Oxford
David, Evan	. .	Radyr Court, Cardiff, Glamorganshire
Davies, Evan	. .	Paton, Wenlock, Salop
Davies, D. Saunders . . .	United Univ. Club	Pentre, Newcastle, Emlyn
Davies, Rev. Thomas . . .	. .	Jesus' College, Oxford
Davies, W. H.	Church-st., Chels.	
Davis, William	. .	Bicester, Oxfordshire
Davis, William H. . . .	. .	
†Davis, Samuel	. .	Swerford Park, Banbury, Oxon.
†Davis, Richard	. .	Skeynes, Edenbridge, Seven Oaks, Kent
Davison, Thomas	. .	Durham
Dawson, Edward E. . . .	. .	Ingthorpe, Stamford, Lincolnshire
Dawson, Edward	. .	Aldcliffe Hall, Lancaster
Day, Isaac	. .	Northleach, Gloucestershire
Deane, James	. .	The Yews, Tottenham
Deane, Ralph	. .	Escourt House, Reading, Berks.
Deare, Thomas	. .	Longworth, Great Faringdon, Berks.
Dearlove, John	. .	Brightwell, Wallingford, Berks.
Deedes, William	. .	Sandling, Hythe, Kent
†Denbigh, Earl of	. .	Newnham Paddock, Lutterworth, Leic.
Dennis, Robert	. .	Greetham, Horncastle, Lincolnshire
Dent, Joseph	. .	Ribsten Hall, Wetherby, Yorkshire
Denton, Thomas	. .	Lew, Oxfordshire
De Visme, Rev. James . .	. .	Bath
Devon, Earl of	4, Bryanstone-sq.	Powderham Castle, Exeter, Devon.
Dewe, Thomas	. .	
†Dewing, R.	. .	Carbrooke, Watton, Norfolk
Dilke, Captain, R.N. . . .	. .	Maxstoke Castle, Coleshill, Warwicksh.
Dillon, Viscount	. .	Ditchley Hall, Oxfordshire
†Divett, Edward, M.P. . .	20, Chpl.-st, Grov-pl	Bystock, Exmouth, Devon.
Dixon, George	. .	Oxford

Names.	Town Residence.	Country Residence.
Dixon, E.		Ashwood House, Dudley, Worcestersh.
Dixon, Charles		Stanstead Park, Emsworth, Hants.
Dixon, R. W.		Wickham Bishops, Witham, Essex
Dixon, Henry		Witham, Essex
Dixon, Henry		Oxford
Dodd, George		Chenies, Rickmansworth, Herts.
Dodd, W. J., Jun.		Chickenden, Oxfordshire
Dodds, Thomas		Standish Hall, Wigan, Lancashire
Dolphin, J.		Swafield, North Walsham, Norfolk
Dormer, C. C.		Rousham, Woodstock, Oxon.
Dormer, W.		East Hanney, Abingdon, Berks.
Doughty, F. G.		Martlesham, Woodbridge, Suffolk
Drake, C. B.		
Drake, T. T.		Shardloes, Amersham, Bucks.
†Drax, J. S. W. S. Erle		Charborough Park, Blandford, Dorset.
Drewitt, John		Peppering, Arundel, Sussex
Driver, Edward	Richmond-tr, Wh.	Vassall Road, North Brixton, Surrey
Driver, George N.	Richmond-tr, Wh.	
Druce, Samuel		Ensham, near Oxford
Druce, Joseph		Ensham, near Oxford
†Drummond, Andrew Robert	2, Bryanstone-sq.	Cadland, Nw. For, Southampton, Hants.
Drury, George		Eastbourne, Sussex
Duckworth, John		Barnet, Herts.
Duff, A.		Woodcot House, Oxfordshire
Duffield, Christopher		Grantham, Lincolnshire
Duke, W. E.		East Lavant, Chichester, Sussex
Duke, Henry		Earnley, Chichester, Sussex
Dundas, Hon. Thomas		
Dunn, Thomas		Kentbury, Newbury, Bucks.
Dunning, Ralph		Bishop's Burton, Beverley, Yorkshire
Dyer, George		East Tisted, Alton, Hants.
Dyke, Rev. H. S.		Plynt, Cornwall
Dymoke, Hon. Champion	10, Whitehall-pl.	Scrivelsby Court, Horncastle, Lincolnsh.
Eames, John		Ashby-de-la-Zouch, Leicestershire
Enley, William		Oxford
Edgington, Benjamin	Duke-st. Southwrk.	
Edmonds, Albert		Inglesh, Lechlade, Gloucestershire
Edmonds, William		Kilmscott, Lechlade, Gloucestershire
Edwardes, Hon. William		Edmundthorpe, Melton Mowbray, Leic.
Edwardes, Hon. Geo.		Noyadd Llanarth, Aberyron
Edwards, John		Oxford
Edwards, Frederick	1, Stafford-pl. Pim.	Barnham, Thetford, Norfolk
Edwards, E.		
Edwards, Henry		Sutton, Woodbridge, Suffolk
Edwin, John		Sheriff's Linch, Worcestershire
†Elliott, John		Chapel Brampton, near Northampton
Ellison, William		Syzergh Castle, Kendal, Westmoreland
Ellman, Rev. H. J.		
Ellman, John		Glynde, Lewes, Sussex
Ellman, Thomas		Beddingham, Lewes, Sussex
Ellman, R. H.		Glynde, Lewes, Sussex
Elton, George		Redland, near Bristol
Elwood, Lieut. Col. C. W.		Clayton Priory, Brighton, Sussex
Ensworth, Thomas		Oxford
Enys, John Samuel		Enys, near Penryn, Cornwall
Erle, Rev. Christopher		Hardwicke, Aylesbury, Bucks.
Erle, W. H. B.		Baldon, near Oxford
Etwall, William		Manor House, Thruxton, Andover, Han.
Evans, Rev. W.		Pusey, Faringdon, Berkshire

Names.	Town Residence.	Country Residence.
Evans, W.	. .	Hackney, Middlesex
Evans, Richard	. .	Evans Griff, Nuneaton, Warwickshire
Eve, Richard	. .	Silsoe, near Bedford
Everitt, Isaac	6, Torrington-sq.	South Creak, Fakenham, Norfolk
Ewen, Thos. L'Estrange	. .	Dedham, Essex
Eyston, Charles	. .	Hendred, Wantage, Berkshire
Fairthorne, Henry	. .	Brightwell, Wallingford, Berks.
Faithfull, Rev. G.	. .	Lower Heyford, Bicester, Oxon.
Fane, J.	. .	Wormsley, Stoken-Church, Oxon.
Fardell, John	. .	Lincoln
Farmer, Edward	. .	Fazeley, Tamworth, Staffordshire
Farrer, Rev. Richard	. .	Ashley, Rockingham, Northampt.
Farrow, W.	. .	Market Rasen, Lincolnshire
Faulkner, Wm.	. .	Burford, Oxfordshire
Faulkner, John	. .	North-Hinksey, near Oxford
Faulkner, Thomas	. .	Queenford, Dorchester, Dorset.
Faux, Joseph	. .	Cold-Ashby, near Northampton
Fearon, —, Sen.	. .	
Feilden, William, M.P.	14, Hanover-st.	Feniscowles, Blackburn, Lancashire
Ferard, Joseph	8 Figtree-ct Temple	
Fernie, William	. .	Woodchester, Stroud, Gloucestershire
Field, William	. .	Ulceby, Barton, Lincolnshire
Fielden, Joseph	. .	Whillen, Blackburn, Lancashire
Fiennes, Hon. Wm. Twisleton	1, D, Albany	Broughton Castle, Banbury, Oxfordsh.
Filliter, George	. .	
Finch, Richard	. .	Headington, near Oxford
Finlayson, Dr.	. .	Cheltenham, Gloucestershire
Fisher, John	. .	East Hanney, Abingdon, Berks.
Fisher, Rev. R. W.	. .	Hill Top, Kendal, Westmoreland
Fisher, Thomas Richard	. .	Oxford
Fisher, William	. .	Copyhold, Newbury, Berkshire
Fletcher, Sir Henry, Bart.	. .	Ashley Park, Walton-on-Thames, Surr.
Flesher, Rev. J. T.	. .	Tiffield, Towcester, Northampton.
Flight, Thomas	. .	Islington
Floyd, Thomas	. .	Frilford, Abingdon, Berks.
Floyer, J. G.	. .	Ketsbyn, Louth, Lincolnshire
†Floyer, John	. .	Stafford, Dorchester, Dorset.
Foll, William	. .	Chalgrave, Dunstable, Beds.
Footner, W. A.	. .	Romsey, Hampshire
Fordham, John George	. .	Odsey House, near Royston, Herts.
Foreman, Thomas	. .	Acton-Burnell, Much-Wenlock, Salop.
Foreshew, William	. .	Meysey-Hampton, Fairford, Gloucester
Forster, John	18 Carey st, Ln inn	Newton-le-Willows, Bedale, Yorks.
Fort, George	. .	Adderbury House, Salisbury, Wilts.
Foster, J. W.	. .	Clapham, near Settle, Yorkshire
Fowlis, Rev. Henry	. .	Little Brickhill, Fenny-Stratford, Bucks.
Fowke, William	. .	Rudgeley, Staffordshire
Fowler, Henry	. .	Kingham, Chipping-Norton, Oxon.
Fowler, William M.	. .	Sunning Hill, Windsor, Berkshire
Fowlie, Wm.	. .	Red House, Hursley, Winchester, Hants
Fox, Rev. Dr.	. .	Queen's College, Oxford
Ffrance, T. R. Wilson	. .	Rawcliffe Hall, near Preston, Lancashire
†Franklin, Richard	. .	Clementstone, Bridgend, Glamorganshi.
Franklin, Edward L.	. .	Ascott, near Benson, Wallingford, Oxon.
Franklin, John	. .	Ewelm, near Benson, Wallingford, Oxon.
Frazer, Alexander	. .	Claydon, Winslow, Bucks.
Freeman, Thomas	. .	Henham, Wangford, Suffolk
Freere, Rev. E.	. .	Finningham, Eye, Suffolk
Fremantle, Sir Wm., G.C.H.	. .	Englefield Green, Chertsey, Surrey

Names.	Town Residence.	Country Residence.
Frost, W. F.	. .	Thorrington, Colchester, Essex
Fryer, William	. .	Lytchet, Wareham, Dorset.
Fuge, Robert	. .	Dawlish, East Teignmouth, Devon.
Fullard, Thomas	. .	Thorney, Peterborough, Northamptons.
Fullerton, Colonel John	. .	Thrybergh Hall, near Rotherham, York.
Fuller, Hugh	. .	Portslade, Brighton, Sussex
Fulljames, Thomas	. .	Hasfield Court, near Gloucester
Fulljames, Thomas, jun.	. .	Hasfield Court, near Gloucester
Fullshaw, Richard	. .	Knighton, near Leicester
Gabb, Maker	. .	Abergavenny, Monmouthshire
Gage, Hon. W.	. .	Westbury House, Bp's Waltham, Hants.
Gardner, Rev. Christopher	. .	East Dean, Midhurst, Sussex
Gardner, James	. .	Adderbury, Banbury, Oxfordshire
Gardner, James	. .	Banbury, Oxfordshire
Garne, William	. .	Aldsworth, Northleach, Gloucestershire
Garret, Drake	. .	Lamman Park, Aylesbury, Bucks.
Garrett, Richard, jun.	. .	Leiston, Saxmundham, Suffolk
Gater, Caleb H.	. .	Swathling, Hampshire
Gater, Edward	. .	Townhill, Hampshire
Gater, W. B.	. .	West End, Hampshire
Gedney, John	. .	Reden Hall, Harleston, Norfolk
Gee, Thomas	. .	Barton, Lincolnshire
Gibbon, Alexander	. .	Staunton, Gloucestershire
Gibbs, Thomas	. .	Ampthill, Bedfordshire
Gibbs, William	. .	Alveston Hill, Stratford-on-Avon, War.
Gibbs, George	26, Down-st., Pic.	
Gibbs, William	. .	Itchenor, Chichester, Sussex
Gibbs, Joseph	. .	Elsfield, near Oxford
Giblett, John	8, West Smithfield	
Gibson George	. .	Sandgate, Storrington, Sussex
Giddy, C., Com. R.N.	. .	Penzance, Cornwall
Gilbertson, Matthias	. .	Elm Cottage, Egham, Surrey
Gilbert, William	. .	Hippenscombe, Wiltshire
Gilbert, Rev. A. T.	. .	Oxford University
Gillett, Joseph Ashby	. .	Banbury, Oxfordshire
Gillett, W.	. .	South Leigh, Witney, Oxfordshire
Gillett, Joseph	. .	Little Haseley, Tetsworth, Oxfordshire
Gilliat, Aitkin	. .	Scrofield, Horncastle, Lincolnshire
Gills, W.	. .	Alveston Heath, Stratford-on-Avon, War.
Gladwin, Thomas	. .	Marden Park, Godstone, Surrey
Glaister, Henry R.	. .	Bedale, Yorkshire
Glaister, Rev. William	. .	University College, Oxford
Goddard, Horatio N.	. .	Cliff, Wootton Bassett, Wiltshire
Goddard, Edward	. .	Crookham, Newbury, Berkshire
Goddard, Philip		
Goddard, Rev. Richard	. .	Broadstone, Church Euston, Oxon.
†Godfrey, Edward	. .	OldHall, East-Bergholt, Hadleigh, Suff'k
Godfrey, George	. .	Childrey, Wantage, Berkshire
Godfrey, Thomas	. .	Chawley, near Oxford
Godwin, John	. .	Durweston, Blandford Forum, Dorset.
Godwin, Richard		
Gonne, Thomas George	. .	Great Vaynor, Narbeth, Pembrokeshire
Good, George	. .	Gussage, Cranborne, Dorset.
†Goodden, John	. .	Compton House, Sherborne, Dorset.
Goodenough, Joseph	. .	Nether-Cerne, Dorchester, Dorset.
Goodlake, T. Mills	. .	Wadley House, Faringdon, Berks.
Goodlake, Thomas	. .	Benhams, Wantage, Berks.
Goodricke, Sir Francis L. H., Bt.	. .	Studley Castle, Alcester, Warwickshire

Names.	Town Residence.	Country Residence.
Gore, Ormsby, M.P.	66. Portland-place	
†Goring, Harry Dent, M.P.	Windham Club	Yapton Place, Arundel, Sussex.
Goring, Mrs.	. .	Wiston Park, Steyning, Sussex
Goring, Charles	. .	Wiston Park, Steyning, Sussex
Gorringe, J. P.	. .	Eastbourne, Sussex
Gorringe, Mrs. J. P.	. .	Eastbourne, Sussex
Gosford, William	. .	Everingham, Pocklington, Yorkshire
Gough, Frederick	. .	St. Alban's, Hertfordshire
Gower, G.	. .	Dilham, North Walsham, Norfolk
†Gower, W. Leveson, Jun.	. .	Titsey Place, Godstone, Surrey
Gowing, Edward	. .	Eye, Suffolk
Graburn, R. S.	. .	Branswell Cottage, Sleaford, Lincolns.
Graburn, William	. .	Barton-on-Humber, Lincolnshire
†Gratwick, W. T.	. .	Ham, Arundel, Sussex
Grace, James		Wordrobes, Risborough, Bucks.
Grace, Rev. H. T.	. .	Jevington, Eastbourne, Sussex
Graham, Captain, R.N.	. .	Netherby Hall, Longtown, Cumberland
Graham, Rev. H. G.		
Grain, P.	. .	Chilford, Cambridgeshire
Grant, J. C.	. .	Stamford, Lincolnshire
Grantham, Stephen	. .	Stoneham, Lewes, Sussex
Graves, Robert	. .	Bloxholm, Sleaford, Lincolnshire
Greaves, Edward	. .	Barford, near Warwick
Green, Richard	. .	Great Gonnerby, Grantham, Lincolns.
Green, —		
Green, Rev. G. W.	. .	Court-Henry, Llandeilo, Narbeth, Pem.
Greene, W. Burnaby	. .	Wickham, Bishop's Waltham, Hants.
Greenaway, Charles, M.P.	. .	Barrington Grove, Burford, Oxfordshire
Greenwood, Charles	. .	Wallingford, Berkshire
†Gregg, Thomas		
Gregory, William	. .	Cirencester, Gloucestershire
Gregory, Arthur F.	. .	Styvichal Hall, Coventry, Warwicks.
Gregory, Thomas	. .	Cutslow, Oxfordshire
Gresley, Rev. W.	. .	St. Charles, Lichfield, Staffordshire
Grey, Sir Chas. Edw., Bt., M.P.	. .	The Oaks, Carshalton, Surrey
Grey, W. H. C.	10, Cmb.-pl., N. Rd.	Clifton, near Bristol, Gloucestershire
Griffin, John	. .	Hemel-Hemstead, Hertfordshire
Griffith, C. Darby	. .	Padworth House, Reading, Berkshire
Griffith, Mrs. Darby	. .	Padworth House, Reading, Berkshire
Griffith, Samuel Y.	. .	Oxford
Grimshaw, W.	. .	Hackney, Middlesex
Grove, L.		Shenstone Park, Lichfield, Staffords.
†Grove, Thomas	. .	Fern, Shaftesbury, Dorsetshire
Guerrier, William	8, West Smithfield	
Guillemard, John L., F.R.S.	27, Gower-street	Clavering, Stansted-Montfitchet, Essex
Gunner, William	. .	Well Hall, Eltham, Kent
Gurdon, Rev. Thomas	. .	Cranworth, Shipdam, E. Dereham, Nflk.
Guy, George	. .	Turl, Oxfordshire
Gwilt, Rev. Daniel	. .	Icklingham Rectory, Mildenhall, Suffk.
Hack, James	. .	Bowley, Chichester, Sussex
Haines, Edward	. .	Stratton, Cirencester, Gloucestershire
Halcomb, William	. .	Poulton, Marlborough, Wiltshire
Halcomb, W. H.	. .	Hungerford, Berkshire
Hale, Thomas	. .	East Hanney, Abingdon, Berks.
Halke, Rev. J	. .	Weston-by-Welland, Northamptonshire
Halton, John		
Hall, John	. .	Bretforton, Evesham, Worcestershire
†Hall, John	. .	Wiseton, near Bawtry, Nottinghamsh.

Names.	Town Residence.	Country Residence.
Hall, George Webb . . .	. .	Sneed Park, Bristol
Hall, Henry	. .	Holbrook, Wincanton, Somersetshire
Hall, Richard	. .	Cirencester, Gloucestershire
Halstead, Thomas . . .	. .	Woodcot, Nantwich, Cheshire
†Hamilton, Captain Archibald	. .	Rozelle, nr. Newton-upon-Ayr, Ayrshire
Hammans, C.	. .	Garford, Abingdon, Berkshire
Hammersley, Hugh . . .	69, Pall Mall . .	Great Haseley, Tetsworth, Oxfordshire
Hamond, Wm. P.	123, Mount street .	
Hanbury, John	. .	Carborough, Lichfield, Staffordshire
Hanbury, Osgood	. .	Coggeshall, Essex
Hancock, Abraham . . .	. .	Hall Place, Rockley, Warnford, Hants
Handley, Major	. .	Pointon, Folkingham, Lincolnshire
Hanmer, Lieutenant-Colonel .	. .	Bear Place, Maidenhead, Berks.
Hannam, George	. .	Alland Grange, Isle of Thanet, Kent
Hannam, Henry S. . . .	. .	Burcott, Bensington, Oxfordshire
Hannen, Henry, Jun.		
Harcourt, Capt. Octavius, R.N.	. .	Swinton Park, Bedale, Yorkshire
Harcourt, W. B.	. .	St. Leonard's, Windsor, Berks.
Harding, Joseph	. .	Maiden-Bradley, Mere, Wiltshire
Hare, Joseph	. .	Wilton Farm, Beaconsfield, Bucks
†Hare, T.	. .	Springfield, Bristol
Harford, W.	. .	Barly Wood, Bristol
Harland, Wm. Chas., M. P.	3, Chesterfield-st.	Sutton Hall, Easingwold, Yorkshire
Harris, William	. .	Weston, Leamington, Warwickshire
Harris, Richard	. .	Wootton Grange, Northamptonshire
Harris, John	. .	Hinton, Wantage, Berkshire
Harris, Robert	. .	Hinton, Abingdon, Berkshire
†Harrison, Richard	. .	Wolverton, Stony-Stratford, Bucks.
Harrison, Daniel	. .	Kendal, Westmoreland
Harrison, Rev. J.	. .	Dinton, Aylesbury, Buckinghamshire
Harrold, O. W.	. .	Donnington Court, Ledbury, Herefords
Hart, H. P.	. .	Beddingham, Sussex
Harvey, Robert B.. . . .	. .	Harleston, Norfolk
Harvey, Robert H.	. .	Sturminster, Newton, Dorsetshire
Harwood, Thomas . . .	. .	Winterfold, Kidderminster, Worcestersh
Hartley, Rev, W. H. H. . .	. .	Bucklebury House, Woolhampton, Brks.
Haselfort, R. L.	. .	Boreham, Chelmsford, Essex
Hastings, John	. .	Longham, East Dereham, Norfolk
Hastings, Matthew . . .	. .	Ensham, Witney, Oxfordshire
Hawkesley, Rev. J. W. . .	. .	Redruth, Cornwall
Hawkins, William	. .	Hitchin, Hertfordshire
†Hawkins, Thomas	. .	Assington, Neyland, Suffolk
Hawkins, William . . .	. .	Colchester, Essex
Hawkins, J. H.	. .	Dorchester, Dorset.
Hawkins, John	. .	Hitchin, Hertfordshire
Hawtrey, John.	. .	
Haynes, William	. .	Handborough, Woodstock, Oxfordshire
Hayward, William . . .	. .	Hintlesham
Hayward, Drinkwater S. . .	. .	Frocester Court, Stroud, Gloucestershire
Hayward, J. Curtis . . .	. .	Quedgeley, near Gloucester
Hayward, Henry	. .	Wattington, near Oxford
Hayward, William. . . .	. .	Manor House, Weston Turville, Bucks
Heald, Dr.	. .	Spalding, Lincolnshire
Heath, Sergeant	. .	Anstey Priory, Dorking, Surrey
Heighton, Edward . . .	. .	
Heiver, John.	. .	
Henning, James	. .	Wolverton, Dorchester, Dorset.
Hercy, John	. .	Hawthorn Hill, Bracknell, Berks.
Herrick, William	. .	Bear Manor Park, Loughboro', Leicest.
Herver, Joseph.		

Names.	Town Residence.	Country Residence.
Hervey, Lionel	. .	Winkfield, Bracknell, Berkshire
Hester, George P.	. .	Oxford
Hewer, Jasper	. .	Minchinhampton. Gloucestershire
Hewer, William	. .	Northleach, Gloucestershire
Hewer, John	. .	Hampton Lodge, near Hereford
Hewer, Joseph	. .	Eastington, Northleach, Gloucest.
Hewitt, Lieut. R.N.	. .	Eastbourne, Sussex
Heygate, Robert	. .	West Haddon, Daventry, Northampton
†Heywood, Sir Benjamin, Bt.	. .	Acresfield, Pendleton, Manchester
Hicks, Leonard	5, Gray's-Inn-sq.	
Hicks, Benjamin	. .	Hanley, Newcastle-under-Lyne, Staff.
Hickson, Richard	. .	Hougham, Grantham, Lincolnshire
Higgins, W. B.	. .	Picts' Hill, Bedfordshire
Hill, Rev. C.	. .	Buxhall, Stowmarket, Suffolk
Hill, Charles	. .	Wellingborough, Northamptonshire
Hillyard, Clark	. .	Thorpelands, near Northampton
Hincks, T. C	. .	Breckonborough, Thirsk, Yorkshire
Hinton, William	. .	Daglingworth, Cirencester, Gloucesters.
Hinxman, Edward, Jun.	. .	Little Dunford, Salisbury, Wilts.
Hitchcock, Henry	. .	Boddicot House, Banbury, Oxfordshire
Hitchman, S.	. .	Chipping-Norton, Oxfordshire
Hitchings, George	. .	Oxford
Hoare, Captain	. .	Wavendon, Fenny-Stratford, Bucks.
Hoare, Hugh Richard	100, Eaton-sq.	Lillingstone, Towcester, Northamp.
Hobbs, Henry	. .	Bocking, Braintree, Essex
Hobbs, William	. .	Bocking, Braintree, Essex
Hobbs, William Fisher	. .	Mark's Hall, Coggeshall, Essex
Hobgen, Charles	. .	Sidlesham, Chichester, Sussex
Hobgen, Joseph	. .	Sidlesham, Chichester, Sussex
Hoblyn, William Paget	. .	Marlhouse, Elmstead, Bromley, Kent
Hodgkinson, Richard	. .	Morton Grange, Dorchester, Dorset.
Hodson, W.	. .	Ilford, Essex
Hodson —	. .	Falmer Court Farm, Lewes, Sussex
Holbeach, William	. .	Farnborough, Kineton, Warwickshire
Holcombe, Rev. G. F.	. .	Brinkley, Newmarket, Cambr.
†Hollist, Hasler	. .	Lodsworth, Midhurst, Sussex
Holmes, William Sandcroft	. .	Redenhall, Harleston, Norfolk
Holton, Rev. L. M.	. .	Woolhampton, Newbury, Berkshire
Hony, Rev. P. F.	Athenæum Club	
Honywood, Rev. P. J.	. .	Mark's Hall, Coggeshall, Essex
Hooton, John Head	. .	Kempston, near Bedford
Hopcraft, Alfred	. .	Halse, Brackley, Northampton.
Hopkins, John	. .	Tidmarsh House, Reading, Berks.
Hopper, Richard	. .	Papplewick, near Nottingham
Horlock, J. W.	. .	The Rooks, Marshfield, Glouces.
Hornsby, Richard	. .	Grantham, Lincolnshire
Horwood, John	. .	Steam Park, Brackley, Northampt.
Hoskins, Kedgwin, M.P.	90, Sloane street	Birch House, Ross, Herefordshire
Hoskins, Sir Hungerford, Bt.	. .	Harewood, Ross, Herefordshire
Hoskyns, Chandos Wren	10, Chester-sq.	Wroxhall Abbey, Warwickshire
Houghton, John	. .	Broom Hill, Sunninghill, Windsor, Bks.
Houldsworth, Thomas, M.P.	16, Suffolk-street	Portland Place, Manchester
House, John	. .	Anderson, Blandford Forum, Dorset.
House, John, jun.	. .	Quailston
Howard, T. A.	. .	Yattenden, Berks.
Howard, Joseph	. .	Aylesbury, Bucks.
Howard, —	. .	Aylesbury, Bucks.
Howard, Charles	. .	14, Monkgate, York
Howard, George	. .	
Howard, H.	. .	Greystock, Penrith, Cumberland

Names.	Town Residence.	Country Residence.
Howard, Hon. Henry . .	. .	Charlton, Malmesbury, Wilts.
Huckvale, Thomas . . .	. .	Over-Norton, Chipping-Norton, Oxon.
Hudson, John	. .	Castleacre, Swaffham, Norfolk
Hull, Richard	. .	Sutton-Benger, Chippenham, Wilts.
Humfrey, J.	. .	Upton, Abingdon, Berks.
Humfrey, John	. .	Upton, Abingdon, Berks.
Humfrey, William . . .	. .	Boxford, Newbury, Berks.
Hunt, James	. .	Oxford
Hunt, Zachary D.	. .	Aylesbury, Bucks.
Husband, T., jun.	. .	Stoke, Devonport, Devon.
Hutley, William	. .	Witham, Essex
Hutt, John	. .	Water Eaton, near Oxford.
Hutt, William	. .	Thrupp, Woodstock, Oxon.
Hutton, John	. .	Sowber Hill, Northallerton, Yorkshire
Hutton, William	. .	Gate Barton, Gainsbro', Lincolnshire
Ide, John	. .	West Wittering, Chichester, Sussex
Ifill, Dr.	9, Welbeck-street	
Ilott, James A.	. .	Bryanston, Blandford Forum, Dorset.
Inge, Captain	. .	
Ingram, ——	. .	Steyning, Sussex
Ingram, Rev. James, D.D. .	. .	Trinity College, Oxford
Inskip, Thomas	. .	Marston, Ampthill, Bedfordshire
Isaacson, John	. .	Clare, Suffolk
Irving John, M.P. . . .	1, Richmond-terr.	Ashford, Staines, Middlesex
Jackman, James	. .	Crendon, Thame, Oxfordshire
Jackson, Hugh	. .	Wisbeach, Isle of Ely, Cambridgeshire
Jaques, R. M.	. .	St. Trinian's, Richmond, Yorkshire
Jarratt, William	. .	Lletai, Glamorganshire
†Jarrett, John	. .	Camerton House, Bath, Somerset.
Jeffrys, R.	. .	Structshill, Bridgewater, Somerset.
Jellicoe, John	. .	Brighterton, near Stafford
Jemmett, Henry	. .	Burford, Oxfordshire
Jenkins, John	. .	St. Ynyn, Cardiff, Glamorganshire
Jenner, Henry	. .	Chisenbury, Pewsey, Wiltshire
Jennings, R. F.	. .	Belsham Green, Sandwich, Kent
Jersey, Earl of, ...	38, Berkeley-squa.	Middleton Park, Bicester, Oxfordshire
Jervis, Sir Raymond . . .	. .	Fair Oak Park, Winchester, Hants.
Jobson, William	. .	Newtown, Wooler, Northumberland
Jodrell, Sir Rd. Paul, Bart. .	64, Portland-place	Sall Park, Reepham, Norfolk
Johnston, Sir F., Bart. . .	. .	Melton Mowbray, Leicestershire
Johnstone, John Hutton . .	. .	Menston, near Ledbury, Herefordshire
Johnson, Rev. A.	. .	Hampton House, Devon.
Johnson, Rev. Dr.	. .	Parran, Cornwall
Johnson, Cuthbert William .	14, Gray's-inn-sqre	Wallingtons, Newbury, Berks.
Johnson, George	53, Tavistock-squ	
Jonas, Samuel	. .	Ickleton, Linton, Cambridgeshire
Jones, Philip, Jun. . . .	. .	Sugwas Court, near Hereford
Jones, John	. .	Harrington, Spilsby, Lincolnshire
Jones, Whitmore	. .	Chassleton, Chipping Norton, Oxon.
Jones, William	. .	Sheep House, near Gloucester
Jordan, Rev. G. W. . . .	. .	Waterstock, Thame, Oxfordshire
Jowett, Rev. J. F. . . .	. .	Kingston, Bagpuze, Abingdon, Berks.
Juckes, Thomas	. .	Fearn, Salop.
Kedward, James D. . . .	. .	
Kemble, H.	. .	Leggatt's, near Hatfield, Hertfordshire

Names.	Town Residence.	Country Residence.
Kemble, Thomas	. .	Leggatt's, near Hatfield, Hertfordshire
Kendle, C. J.	. .	Fordham, Downham Market, Norfolk
Kendle, James	. .	Weasenham, Fakenham, Norfolk
Kensey, George	. .	Cornbury Park Farm, Witney, Oxon.
Kersey, James	. .	Talton, Cirencester, Gloucestershire
Kilby, George	. .	Queenborough, Kent
Kilson, Rev. H.	. .	Folkington, Hailsham, Sussex
Kimberley, George	. .	Trotsworth, Egham, Surrey
Kimber, Thomas	. .	Tyfield Wick, Abingdon, Berks.
Kimber, Thomas	. .	Bourton-on-the-Water, Stow, Glo'ster
Kimber, Thomas	. .	North Cerney, Cirencester, Gloucester
†Kinder, John	. .	Sandridge Bury, St. Albans, Herts.
Kinder, Thomas	. .	Sandridge Bury, St. Albans, Herts.
King, W. F.	. .	Stourton, Mere, Wiltshire
King, Rev. James	. .	Henley-on-Thames, Oxfordshire
King, J. Bennett	. .	Wotton, Abingdon, Berkshire
King, Bolton	. .	Umberslade, Warwickshire
†King, Charles	. .	Little Brinton, Northamptonshire
King, Fielden	. .	Berniton, Petersfield, Hants.
King, F.	. .	Oxford
King, Robert	. .	Wytham, near Oxford
†Kingsmill, William	. .	Sidmanton Park, Whitchurch, Hants.
Kinsman, Rev. R. B.	. .	
Kintore, Earl of	. .	Keith Hall, Aberdeen
Kirby, John	. .	South Moreton, Wallingford, Berks.
Knatchbull, William	. .	Babington, Frome, Somersetshire
†Knight, Henry Gally, M.P. .	69, Grosvenor-st.	Firbeck Hall, Bawtry, Yorkshire
Knight, Edward	. .	Godmersham Park, Canterbury, Kent
Knight, E. Jun.	. .	Troughton House, Alton, Hants.
†Kingscote, Thomas	. .	Kingscote, Tetbury, Gloucestershire
Knapp, H.		
La Coste, Thomas B.	. .	Abbey Mills, Chertsey, Surrey
Lakin, Henry	. .	Severn End, Upton, Worcestershire
Lance, E. J.	74, Albany-street	Barrossa Cottage, Bagshot, Surrey
Langdale, Hon. Charles, M.P.	31, Jermyn-street	Houghton Hall, Market-Weighton, York
Langford, T. C.	. .	Udinore, Rye, Sussex
Large, William	. .	Upper Lambourn, Berkshire
Large, Charles	. .	Broadwell, Burford, Oxfordshire
Latham, R. Cousins	. .	Clifton, Deddington, Oxfordshire
†Law, Rev. R. N.	. .	Christian-Malford, Chippenham, Wilts.
Lawford, Edward	. .	Leighton-Buzzard, Bedfordshire
Lawford, W. R.	. .	Leighton-Buzzard, Bedfordshire
Lawrence, R.	. .	Betterton, Berkshire
Lawrence, James	. .	Astree, Berkshire
Lawson, Andrew	. .	Aldborough Lodge, Boroughbridge, York
Lawson, W. C.	. .	Edinburgh
Leach, George	. .	Stoke, Devonport, Devonshire
Le Couteur, Colonel	. .	Belle-Vue, Jersey
Lediard, Thomas	. .	Cirencester, Gloucestershire
Lees, Charles	. .	Eastling, Faversham, Kent
†Lee, Lee J.	. .	Delington House, Ilminster, Somerset.
Lefevre, John G. Shaw, F.R.S.	5, Hyde Park-gard.	
Lefroy C. E.	. .	Enshot House, Farnham, Surrey
Lemon, Sir C., Bt. MP., F.R.S.	. .	Carclew, Penryn, Cornwall
Lescher, Joseph	. .	Boyles, Brentwood, Essex
Lethbridge, Sir Thos. B., Bart.	6, Upp. Blgrave-st.	Sandhill Park, Taunton, Somerset.
Lewis, John	. .	Llanthetty Hall, near Brecknock

Names.	Town Residence.	Country Residence.
Lewis, Edward		Bayford Bury, near Hertford
Lewis, Robert		Stompain
Ley, Jacob		Christ Church, Oxford
Ley, Rev. Jacob		Oxford
Liefchild, W. G.		Enfield, Middlesex
Lilford, Lord	10, Grosvenor-pl.	Lilford Hall, Oundle, Northamptonshire
Lincoln, Earl of	25, Park-lane	Ranby Hall, Retford, Nottinghamshire
Lindsell, R		Biggleswade, Bedfordshire
Lines, W.		Haddenham, Thame, Oxfordshire
Linnell, Richard		
Linton, Rev. J.		Hemingford, St. Ives, Huntingdonshire
Lismore, Viscount	11, Up. Belgrave-st.	Shanbally Castle, Clogheen, Ireland
Little, William Hunter		Lanvair Grange, Abergavenny, Monm.
Littlewood, John		Armthorpe, Doncaster, Yorkshire
Livesay, Thomas		Hackney, Middlesex
Lloyd, Rev. Thomas J.		North Wraxall, Chippenham, Wilts
Lloyd, Cynnic		Pontryfyth, Denbigh, North Wales
Lloyd, L. F. Lloyd		Pontryfyth, Denbigh, North Wales
Lloyd, Llewellyn		Pontryfyth, Denbigh, North Wales
Lloyd, W.		Aston, Oswestry, Salop.
Lloyd, Rev. T.		Swayfield, North Walsham, Norfolk
Lock, George		Oxford
Lock, George		Blandford, Dorsetshire
Loft, William		Trusthorpe, Alford, Lincolnshire
Long, Walter, M.P.	29, Mill-street	Preshaw House, Alton, Hampshire
Long, Walter J.		Preshaw House, Alton, Hampshire
Longstaff, Charles		
Lord, C.		Bridge Norton, Witney, Oxon.
Lord, Richard		Hambleden, Henley-on-Thames, Oxon.
Lousley, Job		Hampstead-Norris, East Ilsley, Berks.
Lovesey, C. W.		Charlton Kings, Cheltenham, Glouc.
Lowe, Charles		Stamford, Lincolnshire
Lowndes, William		Brightwell, Tetsworth, Oxon.
Lucan, Earl of	Spntine-ter, Knisbg	Laleham, Staines, Middlesex
Lucas, Joseph		Rowsham, Aylesbury, Bucks.
Lugor, Elwood		Hengrave, Bury St. Edmund's, Suffolk
Lumbert, R. C.		Burghleigh Hill, Reading, Berks.
Lush, Joseph		Kilmington, Bruton, Somersetshire
Lyne, William		Kingham, Chipping-Norton, Oxon.
†Lyon, James Wittit	39, Belgrave-sq.	
Mabbott, W. C.		Lewes, Sussex
Macbride, Richard		Oxford
Macdonald, Alexander	3, St. Mildred's-ct.	
†Mackenzie, Sir Francis A., Bt.	60, Lombard-street	Gairlock, Poolew, Ross-shire, N. B.
Maclaine, Colonel		
Macnamara, A.		Langoed Castle, Brecknock
Maitland, F. C.	Mincing-lane	
†Mainwaring, Townsend		Great Markwell Hall, Wrexham, Denb.
Malins, Daniel		Brackley, Northamptonshire
Mallam, Thomas		Oxford
Maltby, E. H.	Temple	
Manby, Capt. Geo. W., F.R.S.		Yarmouth, Norfolk
Manning, John		Harpole, near Northampton
†March, Earl of	51, Portland-pl.	Goodwood Park, Chichester, Sussex
Marden, William		Rainham, Norfolk
Margetts, William		Woodstock, Oxfordshire
Marmont, James		Bristol

Names.	Town Residence.	Country Residence.
Marshall, Captain Henry	4, Upp. Eaton-st.	
Marshall, William, M.P.	41, Upp. Grov.-st.	Patterdale Hall, Carlisle, Cumberland
Marshall, William		Hurst, Chichester, Sussex
Marsham, R.		Merton College, Oxford
Marsham, Robert		Stratton Strawless Hall, Aylesham, Nfk.
Martin, Edward Wenman	61, Up. Seymour-st	Brickwood House, Croydon, Surrey
Martin, Henry Burgess	33, Eaton-place	Colston Hall, Bingham, Nottinghams.
Martin, Robert		Asterby, Horncastle, Lincolnshire
†Mason, C. A.		Farrinton, Ledbury, Hereford
Massingberd, Rev. Algernon		Gunby Park, Spilsby, Lincolnshire
Massop, John		
Masters, Joseph		Witney, Oxfordshire
Masters, Robert.		
Maton, James		Collingbourne, Pewsey, Wilts.
Matson, Charles		Baddow Park, Chelmsford, Essex
Matson, Robert		Wingham, Kent
Matthew, John		
Matthews, Peter		Elkstone, Cirencester, Gloucestershire
Matthews, John		Oxford
Matthews, Stephen		Lidiard, Swindon, Wiltshire
Mauleverer, William		Arncliffe Hall, Settle, Yorkshire
Maw, George		Walkhouse Barrow
Maxwell, W.		Everingham, Pocklington, Yorkshire
May, Charles		Ipswich, Suffolk
Maydwell, Daniel		Leatherhead, Surrey
Mayne, John Thomas, F.R.S.	Temple	Teffont House, Salisbury, Wilts,
Menteath, Sir Chas. G. S., Bt.		Closeburn Hall, Dumfries, N. B.
†Metcalf, C. J., Jun.		Roxton House, St. Neot's, Huntingdons.
Milden, T.		Brinnington Hill, Warwick
Mildmay, P. St. John, M.P.	21, Edw-st, Port-sq	Hasle Grove House, Sherborne, Dorset.
Miller, Rev. M. H..		Scarborough, Yorkshire
Miller, William		Water Eaton, nr Oxford
Millington, Bryan		Asgarby, Sleaford, Lincolnshire
Mills, C. S..		Newbury, Berkshire
Mills, Rev. William		Shellingford, Faringdon, Berks.
Mills, J.		Ulceby Barton, Lincolnshire
†Milne, Alexander	Whitehall	
Milne, J. L.		Hilgay Lodge, Downham, Norfolk
Milnes, R. Monckton, M.P.	26, Pall Mall	Fryston Hall, Pontefract, Yorkshire
Monck, J. B.		Coley Park, Reading, Berks.
Monckton, G.		Stretton, Penkridge, Staffordshire
Montefiore, J. B.	16, Geo.-st. Ma.-ho.	
Moody, C. A.		Kingsdown, Ilchester, Dorset.
Moor, Major Edward, F.R.S.		Bealings, Woodbridge, Suffolk
Moore, Rev. H.		Willingdon, Eastbourne, Sussex
Mordaunt, Rev. C..		Badgworth Cross, Axbridge, Somerset.
Morgan, George		Biddlesden Park, Brackley, Northamps.
Morland, G. B.		Abingdon, Berkshire
Morrell, James, Jun.		Headington Hill, Oxford
Morrell, Mark T.		Oxford
Morrell, Frederick J.		Oxford
Morton, John Chalmers		Chester Hill, Stroud, Gloucestershire
Mount, William		Wasingplace, Newbury, Berkshire
Mountford, ——		Barrows Farm, Lambourn, Berkshire
Mumford, George		Downham-Market, Norfolk
Munday, S..		Abingdon, Berkshire
Mundy, H.		Andover, Hampshire
Mundy, J.		Cullam, Abingdon, Berks.
Muskett, James		Lambsgrey Fm. Dean Frst, Newnham, Gl.
Muskett, John		Farnham, Bury St. Edmund's, Suffolk

Names.	Town Residence.	Country Residence.
Myers, T. Dynely	. .	Langford, Lechlade, Gloucestershire
Myers, Thomas	. .	Langford, Lechlade, Gloucestershire
Nalder, John	. .	North Moor, near Oxford
Nash, Joseph	. .	Reigate, Surrey
Nash, John	. .	Reigate, Surrey
Nash, W.	. .	Langley
Nash, Charles	. .	Royston, Hertfordshire
Neale, Stephen	. .	Tytherington, Warminster, Wiltshire
Neale, H. St. John	. .	Ringwood, Hampshire
Neame, Charles	. .	Selling, Faversham, Kent
Neame, Frederick	. .	Sellinge, Faversham, Kent
Neame, John	. .	
Neame, Thomas	. .	Canterbury, Kent
Neave, Sheffield	. .	
Neeld, ——	. .	Red Lodge, Cricklade, Wiltshire
Neeve, ——		
Nelson, Rev. Edward		
Nelson, Rev. J.	. .	Childrey, Wantage, Berkshire
Neve, John	. .	Benenden, Cranbrook, Kent
Neve, Thomas	. .	Tenterden, Kent
Newman, Charles	. .	Hayes, Uxbridge, Middlesex
Newnham, Henry	. .	
Newton, Marcellus	. .	Wareham, Hereford
Newton, M.	. .	Wareham, Hereford
Newton, Richard	. .	Britwell, Watlington, Oxon.
Niblett, D. J.	. .	Haresfield, Stroud, Gloucestershire
Nicholds, M.	. .	Saffron-Walden, Essex
Nicholson, W. H.	1, Robert-st., Adel.	
Nicholson, Brady	. .	Wootton Barrow
Nicklin, Richard	. .	Tipton, nr Birmingham
Noakes, T.	. .	Warncocks, near Eastbourne, Sussex
Norreys, Lord, M.P.	40, Grosvenor-sq.	Wytham Abbey, Abingdon, Berkshire
Norris, W. John	. .	Radwell House, Baldock, Herts.
North, Frederick	. .	Rougham, Swaffham, Norfolk
North, Lieut.-Col.	. .	Wroxton Abbey, Oxon.
Northcote, Henry Stafford	University Club	Pyne's, Exeter, Devonshire
Northeast, Thomas	. .	Tedworth, near Andover, Hants.
Northey, Edward S.	. .	Epsom, Surrey
Nott, John	. .	
Noyes, Finch	. .	Lavoistock Hall, Salisbury
Noyes, Thomas H.	. .	East Mascalls, Lindfield
Oakley, Thomas	. .	Water End Farm, Sandridge, St. Alban's
Oakley, John	. .	Larkin Hall, Frindsbury, Rochester, Kt.
O'Brien, Stafford	. .	Blatherwick Park, Stamford, Lincolns.
Ogle, Henry	. .	Eastbourne, Sussex
Oliver, William	. .	
Oliver, John	. .	Abingdon, Berkshire
†Oliverson, Richard	14, Portland-place	
Olliver, James	. .	Handford, Blandford Forum, Dorset.
Orleback, R. Lonquest	. .	Henwick House, Beds.
Ormond, William	. .	Wantage, Berkshire
Osborne, C.	. .	Haling, Ensworth
Overman, C. E.	. .	Burnham Westgate, Norfolk
Overman, T. W.	. .	Maulden, Ampthill, Bedfordshire
Overman, W.	. .	Burnham Sutton, Burnham Westg. Norf.
Overman, Henry	. .	Weasenham, Fakenham, Norfolk

ENGLISH AGRICULTURAL SOCIETY,

1839—1840.

English Agricultural Society.

GENERAL MEETING,

5, Cavendish Square, December 14, 1839.

REPORT OF THE COMMITTEE.

The Committee of Management have the satisfaction of presenting to the General Meeting a most favourable Report of the present state of the Society, and of the rapid, but secure establishment of the principles on which it has been founded, and whether in the increase of the number of its members, the state of the finances, or the favourable reception of the periodical Journal, as the medium of communication for its Papers,—the Committee have the pleasure of submitting under each of these heads the most satisfactory statements, in detail, to the subscribers.

The Finance Committee have laid before the general Board the most clear and ample details respecting every branch of revenue, expenditure, and contingent assets and claims on the funds. These documents will be laid before you this day, and a summary of their results will be printed as a balance-sheet in the forthcoming number of your Journal.

It may be only necessary to remark in this place, that the funded property of the Society consists of 4000*l.* stock, in the New 3½ per Cents., with a current cash balance of 504*l.* 1*s.* 11*d.*, besides a large amount of unpaid subscriptions, respecting the payment of which the Committee entertain no doubt; the outstanding bills not yet presented for payment being estimated at 187*l.* It also appears that the available income of the Society may be estimated at 2666*l.* per annum, exclusive of what may arise from the subscriptions of new members. The premiums offered for the ensuing year amount to the sum of 1000 guineas. The Finance

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Committee have also completed their examination and settlement of the whole of the accounts relative to the Oxford Meeting, a balance-sheet of which is now laid on the table, and a copy directed to be sent for the use of each member of the Committee of Management. The Committee cannot report this termination of their transactions with the City of Oxford without expressing, in the strongest terms, their thanks to the members of the University and Corporation in general, for the interest they evinced in their proceedings, and their support and promotion of the objects of the Society, and they would especially record their sense of the favour shown them by the Vice-Chancellor, the Provost and Fellows of Queen's College, the Professor of Geology, the Mayor and civil authorities, and the co-operation of the Local Committee on that occasion.

The Society having been invited by the nobility and gentry of Cambridge to hold their next meeting in that town, the Sub-Committee appointed to take preliminary steps for the requisite arrangements for the meeting in July next, having presented a Report after a deputation to Cambridge, recommending Parker's Piece as a suitable site for the meeting, the Committee of Management have resolved to erect on that space of ground a temporary building for the cattle-yard, and also a dinner-room capable of accommodating at least two thousand persons.*

The Committee have also passed the following resolutions, in reference to the exhibition of stock:—

1st. That no animal which won a first prize in any class at the meeting at Oxford, shall be allowed to compete for a similar premium at Cambridge.

2nd. That any person who shall have been proved, to the satis-

* The Master of Downing College having communicated to his Grace the Duke of Richmond, in the most handsome and liberal manner, the wishes of himself, and the Professors and Fellows of Downing College, that the English Agricultural Society would accept the offer of the Quadrangle of that College for the purpose of their great Dinner at the Cambridge Meeting, the Committee of Management have rescinded their former Resolution, and have unanimously accepted this invitation.—The day of the Meeting is fixed for Wednesday the 15th of July.

facticn of the Committee, to have been excluded from showing for prizes at the exhibition of any society, in consequence of having been convicted of an attempt to obtain a premium by giving a false certificate, shall not be allowed to compete for any of the prizes offered by this Society.

3rd. That in case any gentleman or number of gentlemen wish to offer a prize for any class of stock not specifically named in the prizes offered by the Society, that he or they may be permitted to do so at the next Cambridge meeting, and the stock which shall compete for such prize shall be exhibited subject to such conditions as shall be decided upon by the Committee, and the prize awarded by such of the Judges as the Committee shall select. Animals exhibited for such prizes shall not be prevented from competing for any of the prizes offered by the Society for which they are qualified.

4th. That all sheep exhibited for the prizes shall have been really and fairly shorn between the 1st of May and the 1st of July next previous to the day of show.

With regard to the distribution of the Journal, every effort has been made to place the copies free of expence in the hands of the subscribers throughout the kingdom, but it having appeared, however, that in some cases they have not duly reached their destination, the Society, on being informed of any omission in their delivery, will give immediate directions for such copies to be sent direct to the parties so requiring them. They have also to announce that the arrangements are completed for the new Number of the Journal, and that it will make its appearance on the 1st of February.*

The English Agricultural Society having held out an offer to receive communications from local agricultural associations, and

* His Grace the Duke of Richmond, as President of the Society, suggested to the Meeting a mode for the distribution of the Journal, subsequently adopted by the General Committee on the 15th of January, as the simplest and most efficient arrangement for placing the copies in the hands of the subscribers, free of expence, and with the greatest security and least loss of time. The announcement of this plan is made at the commencement of the present Number of the Journal.

received from various societies intimations of a desire to be in such relation to this Society, the Committee, in reference to a distinct application recently made to the Committee by Sir Charles Lemon, on behalf of the Cornwall Agricultural Society, have Resolved, —That for the purpose of further promoting the objects for which the English Agricultural Society was founded, it is expedient to receive communications from local societies upon subjects solely connected with these objects, presenting to such societies a copy of the Journal whenever any Paper communicated by them to the Journal Committee shall have been deemed suitable for publication, the standing type being also placed at their disposal for printing off as many private copies of the Paper as may be required for distribution among their own members.

In order to offer to the various members of the Society visiting the metropolis during the Smithfield-Show week an opportunity of assembling in the Society's rooms, the Committee have publicly announced, this year, the circumstance of the rooms in Cavendish-square being thrown open every evening for their accommodation.

In consequence of the vacancy occurring in the Committee of Management, by the unavoidable resignation of the Speaker of the House of Commons, the Committee availed themselves of the opportunity of electing Mr. Shaw, your late Secretary, to fill the vacancy thus occasioned in the requisite number of members in that Committee.

The Committee beg to distinctly acknowledge the donations made to the Society of agricultural books, specimens, implements, and other suitable presentations in accordance with the objects and principles of the Society, which, by further additions, they trust will eventually become a valuable source of reference for the members of the Society at large.

The English Agricultural Society consists at this time of 2007 members.*

RICHMOND, PRESIDENT.

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* At the present date, the total number of subscribers has amounted to 2172: the Society now consisting of 79 Life-Governors, 187 Governors, 112 Life Members, 1792 Members, and 2 Honorary Members.—Jan. 29, 1840.

STATEMENT OF THE RECEIPTS AND EXPENDITURE OF THE ENGLISH AGRICULTURAL SOCIETY,

From the period of its formation, in MAY, 1838, to the 1st DECEMBER, 1839.

RECEIPTS.

			£. s. d.
By Life Governors' Compositions			3947 10 0
Life Members' Compositions			1021 10 0
			4969 0 0
By Annual Subscriptions from Governors, received in 1838 .		£650 5 0	
„ „ „ in 1839 . .		380 0 0	
		1030 5 0	
From Members, received in 1838 . . .	356 14 0		
„ „ 1839 . . .	992 15 0		
„ in advance for 1840 . . .	11 0 0		
		1360 9 0	
			2390 14 0
			7359 14 0
By Dividends on the Permanent Investment,—			
due on the 5th of Jan. 1839		34 9 7	
due on the 5th of July, 1839		51 18 4	
			86 7 11
			£7446 1 11

NOTE.—There are Subscriptions due, for the year 1839, not yet received,—

From Governors . . .	£514
From Members	606
	1120
And in Jan. 1840, there will be a further Dividend due on the Permanent Investment for Half a Year's Interest	70
Further assets due and forthcoming	£1190

	£7446 1 11

EXPENDITURE.

		£. s. d.
For the Charges of Management; viz.—		
Advertisements	£149 19 4	
Stationery, Postages, Carriage of Parcels, Books, Maps, &c.	168 16 4	
Printing and Lithography	277 10 3	
Salaries to the Secretary and Editor (including Clerk), Housekeeper, &c., to the 1st November, 1839 . .	441 0 0	
Rent paid to Michaelmas, 1839	450 0 0	
Miscellaneous Payments for Meetings at Taverns, Coals, &c.	49 10 0	
		1536 15
For the Amount of Prizes distributed,—		
For Essays	70 0 0	
For 62 Prizes distributed at Oxford	868 0 0	
		938 0 0
For the Cost of Furniture, &c.		155 9 10
For the Oxford Meeting in July, 1839; being the Balance due thereon, for an excess of payments over the receipts .	293 19 7	
For further Disbursements by Mr. Shaw	13 0 4	
		306 19 11
Total Amount of Payments		2917 5 8
For the Balance in favour of the Society on the 1st of December, 1839, which is thus accounted for: viz.—		
By the Permanent Investment for the purchase in the New 3½ per cents., £1970 8 10 stock, cost in money	2000 0 0	
996 5 3 ditto ditto	1000 0 0	
1033 5 11 ditto ditto	1024 5 1	
£4000 0 0 stock, which cost	£4024 5 1	
By Cash in the hands of Messrs. Drummond, bankers .	476 1 11	
By Cash in the hands of Messrs. Parsons, Oxford bank .	6 3 0	
By Petty Cash in the hands of the Secretary	22 6 3	
		4528 16 3
		£7446 1 11

NATH. W. SYMONDS, *Accountant.*

London, 4th Dec. 1839.

SUMMARY STATEMENT OF THE RECEIPTS AND EXPENDITURE OF THE ENGLISH AGRICULTURAL SOCIETY, AT THE OXFORD MEETING HELD IN JULY, 1839.

RECEIPTS.

	£. s. d.
To the Sale of 2385 Tickets for the Dinner	1158 10 0
The Amount of Receipts for Admission to the Cattle-Yard	1235 14 2
Mem.—2317 Tickets were sold at 10*s*. . . . £1158 10*s*. 68 issued to the Judges' Visitors and Reporters were not paid for. 2385	
To the Balance of this Account, being an excess of Payments over the Receipts, and charged to the General Account of the Funds of the English Agricultural Society	293 19 7
	£2688 3 9

EXPENDITURE.

		£. s. d.
Dinner Expences.		
By paid to Mr. Griffith for 2420 Dinners, at 10*s*. each	£1210 0 0	
Less for an Allowance made by him towards the Expences of Fiting-up the Room, at 2*s*. 6*d*. each	302 10 0	
		907 10 0
Expences of Fitting-up the Quadrangle of Queen's College.		
By paid Matthew and Hudson, as per Contract, for the Building and Fitting-up the Room; extra Fitting-up the Cloisters, including 30*l*. for Lighting, and for Tan-strewing the High-street, and removing the same, and Beer for the Men	648 2 0	
Paid Mr. Edgington for Canvas covering the Building	122 0 0	
Paid Beesley and Co. for Carriage of Canvas, &c.	12 0 7	
Paid for Printing Tickets, &c.	14 1 6	
Incidental Expences	21 12 0	
		817 16 1
Expences of the Judges.		
By Amount paid to thirteen of the Judges for their Expences (the eighteen other Judges having made no claim)		140 14 11
Cattle-Yard.		
By paid to Wyatt and Vaughan for Enclosing the Yard, and Beer for the Men	158 13 6	
Paid to Mr. Redhead for Erecting the Pens and other Carpenters' Work, and Beer for the Men	314 0 0	
Paid to Mr. J. Pinfold for Compensation for the Use of the Yard, Forage, &c.	102 17 7	
Sundry incidental Charges	59 0 0	
		634 11 1
By Printing and Advertisements		49 0 5
Incidental Charges		138 11 3
		£2688 3 9

This Account examined by

D. BARCLAY.
C. B. CHALLONER.
THOMAS RAYMOND BARKER.

London, 4th December, 1839.

LIST OF GOVERNORS.

[LIFE-GOVERNORS are distinguished by a mark thus †.]

Governors.	Town Residence.	Country Residence.
Abingdon, Earl of	Clarendon Hotel	Wytham Abbey, near Oxford
†Acland, Sir T. D. Bt., M.P., F.R.S.	10, Upp. Harley-st.	Killerton Park, Collumpton, Devon.
Adeane, Henry John . . .	. .	Babraham House, Cambridge
Alston, Rowland, M.P. . .	48, Harley-street .	Pishiobury, Sawbridgeworth, Herts.
Alston, R. Gardiner . . .	48, Harley-street .	Pishiobury, Sawbridgeworth, Herts.
Amherst, Earl	66, Grosvenor-st. .	Montreal, Seven Oaks, Kent.
†Angerstein, John	23, St. James's-sq.	Weeting Hall, Brandon Ferry, Norfolk
Antrobus, Sir Edmund, Bart. .	146, Piccadilly . .	Amesbury Abbey, Salisbury, Wilts.
†Arcedeckne, Andrew . . .	1, Grosvenor-sq .	Glevering Hall, Wickham Market, Suffk.
†Astley, Sir Jacob Henry, Bart.	7, Cavendish-sq.	Melton Park, East Dereham, Norfolk
†Aylesford, Earl of	50, Grosvenor-st.	Parkington Hall, Coventry, Warwicksh.
Bagge, William, M.P. . .	Carlton-club . .	Stradset Hall, Downham Market, Norfk.
Baker, Thos. John Lloyd . .	. .	Hardwicke Court, Gloucester
†Barclay, Charles	43, Grosvenor-pl. .	Bury Hill, Dorking, Surrey
†Barclay, David	8, Belgrave-square	Eastwick Park, Leatherhead, Surrey
†Baring, Hon. William B., M.P.	12, Gt. Stanhope-st.	
Baring, Sir Thomas, Bart. .	21, Devonshire-pl.	Stratton Park, Winchester, Hants.
†Barker, John Raymond . .	. .	Fairford Park, Fairford, Glouc.
Barker, Thomas Raymond .	. .	Hambleden, Henley-on-Thames, Oxon.
†Barneby, John, M.P. . . .	34, Portman-sq.	Brockhampton House, Bromyard, Heref.
Bassett, John	12, Upp. Brook-st.	
†Beach, William		
Beaufort, Duke of	22, Arlington-st.	Badminton, Chippenham, Glouc.
Benett, John, M.P. . . .	Limmer's Hotel	Pyt House, Hindon, Wilts.
Berens, Richard	19, Queen-st. M.Fr.	Sidcup, Foot's Cray, Essex
Bevell, J.		
Bisshopp, James	. .	Westburton, near Petworth, Sussex
Blachford, Fitz Roy . . .	. .	Osborn, Cowes, Isle of Wight, Hants.
Blake, William, F.R.S. . .	62, Portland-place	Danesbury, Welwyn, near Hertford
†Blanshard, Henry . . .	37, Gt. Ormond-st.	Kirby-in-le-Soken, Manningtree, Essex
Blount, William	12, Cumberland-st.	
Bonsor, Joseph	. .	Polesden, Great Bookham, Surrey
Boucher, John George . .	. .	Shadfield, near Wickham, Hants.
†Bowes, John, M.P. . . .	26, Charles-street .	Streatham Castle, Staindrop, Durham
Bowles, J. S.	. .	Milton Hill, Abingdon, Berks.
Bramston, Thomas Wm., M.P.	11, Hereford-street	Skreens, Chelmsford, Essex
Braybrooke, Lord	10, NwBurlingtn-st	Audley-End, Saffron Walden, Essex
Bridport, Lord	12, Wimpole-st. .	Cricket Lodge, Chard, Somersetshire
Bridges, Sir Brook Wm., Bart.	. .	Goodnestone Park, nr. Wingham, Kent
Bruges, Wm. Heald L., M.P.	3, Suffolk-street. .	Seend Lodge, Melksham, Wilts.
Buckingham, Duke of . . .	Pall Mall . . .	Stowe Park, near Buckingham
†Buller, Edward, M.P. . . .	5, Suffolk-place . .	Dilhorne Hall, Cheadle, Staffs.
Buller, T. Wentw. Capt. R.N.	37, Bryanston-sq	
Bulteel, John C.	9, Grafton-street .	Fleet House, Yealmpton, Devon.
†Bunbury, Sir Henry Ed., Bart.	. .	Barton Hall, Bury St. Edmund's, Suffk.
Burdett, Sir F., Bart., M.P. .	25, St. James's-pl.	Foremark, near Derby

Governors.	Town Residence.	Country Residence.
Burlington, Earl of, F.R.S. .	10, Belgrave-square	Holker Hall, Milnthorpe, Westmoreland
Burrell, Sir C. M., Bart., M.P.	5, Richmond-ter. .	Knep Castle, Horsham, Sussex
†Cambridge, His Royal Highness The Duke of . . .	Cambridge-House, Piccadilly	Kew Palace, Surrey
†Cavendish, Hon. C. C., M.P. .	Burlington-ho., do.	Latimers, Chesham, Bucks.
Cayley, Sir George, Bart. . .	48, Albemarle-st.	High Hall, Brompton, Pickering, Yorks.
Challoner, Colonel C. Bisse .	29, Portman-square	Portnall Park, Virginia Water, Surrey
Chichester, Earl of . . .	17, Stratton-street.	Stanmer Park, Lewes, Sussex
Chichester, Sir Arthur, Bart.	. .	Youlstone, Barnstable, Devon.
†Childers, Jno. Walbanke, M.P.	Carlton Hotel .	Cantley Hall, Doncaster, Yorkshire
†Christopher, Robt. Adam, M.P.	97, Eaton-place	Bloxholme Hall, Sleaford, Lincl.
Clifford, Hon. Charles Thomas	74, Gloucester-pl.	Irnham Hall, Coltersworth, Lincl.
Clive, Lt.-Col. Ed. Bolton, M.P.	18, Grafton-st. .	Whitfield House, near Hereford
†Clive, Hon. Robt. Henry, M.P.	53, LwGrosvenor-st	Oakley Park, Ludlow, Salop.
Cook, William	22, St. Paul'sCh.-yd	Clapham Rise, Surrey
†Copeland, Alderman, M.P. .	37, Linc.-inn-fields	The Poplars, Leyton, Essex
Cotes, John	. .	Woodcote, Shiffnal, Salop.
Crawley, Samuel, M.P. . .	59, Portland-place	Stockwood House, Luton, Beds.
Crompton, Sir S., Bart., M.P.	20, Suffolk-street	Woodend, Thirsk, Yorkshire
Crowdy, James	. .	Highworth, Wilts.
Curteis, Edward Barrett . .	. .	Windmill Hill, Rye, Sussex
Curtis, W.		
Dacre, Lord	2, Chesterfield-st.	The Hoo, near Welwyn, Herts.
†Davenport, E. D.	. .	Calveley, Tarporley, Cheshire
De Beauvoir, R. B. . . .	34, Grosvenor-sq. .	Englefield House, Reading, Berks.
Denison, Wm. Joseph, M.P. .	90, Pall-mall . .	Denbies, Dorking, Surrey
Denison, John Evelyn . . .	. .	Ossington, near Tuxford, Notts.
Dickinson, Francis Henry .	8, Upp. Harley-st.	King Weston, near Somerton, Somerset.
Downshire, Marquess of . .	21, Hanover-sq. .	East Hampstead Park, Bracknell, Berks
Drummond, George . . .	11, Wilton-crescent	
Drummond, A. M. . . .	Charing Cross .	Tile House, Denham, Bucks.
Drummond, Charles . . .	Charing Cross .	Bower Hall, Haver Hill, Suffolk
Duffield, Thomas, M.P. . .	University Club	Marcham Park, Abingdon, Berks.
Dugdale, Wm. Stratford, M.P.	50, Berkeley-sq.	Blythe Hall, Coleshill, Warwickshire
Duncannon, Viscount . . .	3, Cavendish-sq.	Roehampton, Surrey
Duncombe, Hon. Wm., M.P. .	23, Cavendish-sq.	Hooton Pagnell, Doncaster, Yorks.
†Durham, Earl of	13, Cleveland-row	Lambton Castle, Durham
Ebrington, Viscount, F.R.S. .	. .	Phœnix Park, Dublin
†Egerton, T. Wilbraham . .	7, St. James's-sq. .	Tatton Park, Knutsford, Cheshire
Eliot, Lord, M.P.	47, Dover-street .	Port Eliot, St. Germains, Cornwall
Essex, Earl of	9, Belgrave-square	Cassiobury Park, Watford, Herts.
Estcourt, Thos. H. S. B., M.P.	58, LwGrosvenor-st	New Park, Devizes, Wilts.
Estcourt, T. G. B., M.P. . .	41, Dover-street	Estcourt, Tetbury, Glouc.
†Etwall, Ralph, M.P. . . .	Oxf. & Camb. Club	Andover, Hants.
Euston, Earl of, M.P. . . .	7, Grosvenor-place	Salcey Forest, Northampton
Evans, William, M.P. . .	8, Knightsbrdg-ter.	Allestree Hall, near Derby
†Exeter, Marquess of . . .	7, Albemarle-st.	Burghley House, Stamford, Linc.
†Eyre, Charles	. .	Welford, near Newbury, Berks.
Falmouth, Earl of	2, St. James's-sq.	Tregothnan, Truro, Cornwall
Farquharson, J. J. . . .	. .	Langton, Blandford, Dorset.
Fawkes, T. Hawkesworth .	. .	Farnley Hall, Otley, Yorkshire
Fellowes, Edward, M.P. . .	15, LwrBerkeley-st	Ramsey Abbey, Huntingdon.
†Fitzwilliam, Earl, F.R.S. . .	Mortimer House	Milton, Peterborough, Northampton.
Flounders, Benjamin . . .	. .	Yarm, Yorkshire
Foley, J. H. Hodgetts . .	. .	Prestwood, near Stourbridge, Worc.
Freeman, W. Peere Williams.	. .	Fawley Court, Henley-on-Thames, Oxon.

Governors.	Town Residence.	Country Residence.
Gibbs, Humphrey	24, Half Moon-st.	Ampthill, Beds.
Gillies, Robert Maule . . .	Corn Exchange	
Gooch, Sir Thomas S., Bart. .	. .	Benacre Hall, Wrentham, Suffolk
Gordon, Robert, M.P. . . .	29, Dover-street .	Kemble Ho., near Cirencester, Glouc.
Grafton, Duke of	47, Clarges-street .	Euston Hall, Thetford, Norfolk
†Graham, Rt.Hon.SirJ.,Bt.FRS	46, Grosvenor-pl. .	Netherby, by Carlisle, Cumberland
Greathead, Edward	8, Hind-st, Man.sq.	Uddings, nr. Ringwood, Hants.
Guest,SirJ.J., Bt., M.P.,F.R.S.	13, Grosvenor-sq. .	Dowlais Ho., Merthyr-Tydvil, Glamrg.
Guise, Sir John W., Bart. .	. .	Rendcombe Park, Cirencester, Glouc.
Hale, Robert Blagden, M.P. .	15, Bolton-st. . .	Alderley Pk., nr Wootton, Tetbury, Gl.
†Handley, Henry, M.P. . .	30, Pall Mall . .	Culverthorpe Hall, Sleaford, Lincolnsh.
Handley, W. F.	. .	Newark-upon-Trent, Notts.
†Harcourt, George Simon, M.P.	Carlton Club . .	Ankerwycke House, Staines, Bucks.
Harland, Wm. Charles, M.P.	3, Chesterfield-st.	Sutton Hall, Easingwold, Yorks.
Hartopp, Sir Edmd. C., Bart.	169, New Bond-st.	Doe Bank, Sutton Colefield, Warw.
Hatherton, Lord	45, Grosvenor-pl. .	Teddesley Hall, Penkridge, Staffs.
Hayter, W. Goodenough, M.P.	11, Hyde Park ter.	Stoberry Park, Wells, Somerset.
Heathcoat, John, M.P. . .	6, Suffolk-street .	Bolham, Tiverton, Devon.
Heathcote, Gilbert J., M.P. .	Burlington Hotel	Stocken Hall, Grantham, Linc.
Heathcote, Sir W., Bart., M.P.	26, St. James's st.	Hursley Park, Winchester, Hants.
†Heneage, George Fieschi .	. .	Hainton Hall, Wragby, Linc.
†Herbert, Hon. Sydney, M.P. .	1, Grafton-street .	Wilton House, Salisbury
Hervey, William	. .	Bradwell Grove, Burford, Oxon.
Hewett, W. H.		
†Hill, Sir Rowland Bart., M.P.	Limmer's Hotel .	Hawkstone Hall, Whitchurch, Salop.
Hippisley, Henry	. .	Lambourne Place, nr. Hungerford, Berks.
Hodges, Thomas Law, M.P. .	16, Suffolk-street .	Hempsted Park, Benenden, Kent
†Holford, R. S.	43, Grosvenor-sq.	Weston Birt House, Tetbury, Glouc.
Holland, Edward	. .	Dumbleton Hall, Evesham, Worc.
Hope, Henry Thomas, M.P. .	1, Mansfield-st. .	The Deepdene, Dorking, Surrey.
Houblon, John Archer . .	10, Cumberland-pl.	Hallingbury Pl, Bishop Stortford, Herts
†Howick, Viscount, M.P. . .	16, Whitehall-place	Howick House, Alnwick, Northumb.
Hulse, Sir Charles, Bart . .	. .	Breamore Ho., Fordingbridge, Hants.
†Hulse, Lieut.-Colonel . . .	. .	Breamore Ho., Fordingbridge, Hants.
Huntingfield, Lord . . .	. .	Heaveningham Hall, Yoxford, Suff.
†Huntingtower, Lord . . .	. .	Buckminster Park, Colsterworth, Linc.
Hurst, Robert Henry, M.P. .	68, St. James's-st.	Horsham, Sussex
Hyett, W. H.	. .	Painswick House, Stroud, Glouc.
†Ilchester, Earl of	31, Old Burlngtn-st	Melbury House, Sherborne, Dorset.
Johnstone, Sir John V. B., Bt.	27, Grosvenor-sq.	Hackness Hall, Scarborough, Yorkshire
Jones, Rev. J. P.	. .	Elm Green, Cirencester, Glouc.
Keene, Rev. Chas. Edmund .	. .	Swincombe House, Nettlebed, Oxon.
Kensington, Lord	2, Carlton Ho. ter.	
†Kerrison, Lt.Gen.SirE., Bt.M.P.	13, Gt. Stanhope-st.	Oakley Park, Eye, Suffolk
Kenyon, Lord	9, Portman-square	Gredington Hall, Whitchurch, Flints.
Knatchbull, R.Hn.SirE, Bt. MP	71, Lower Grosv.-st.	Mersham Hatch, Ashford, Kent
Labouchere, Rt. Hon. H., M.P.	27, Belgrave-sq. .	Stowey, Somersetshire
Lainson, Alderman John . .	59, Euston-square	
Langston, J. Haughton . .	143, Piccadilly .	Sarsden Ho., Chipping Norton, Oxon.
Lansdowne, Marquess of, F.R.S.	Berkeley-square .	Bowood Park, Calne, Wilts.
†Lawley, Sir Francis, Bart. .	18, Grosvenor-sq. .	Middleton Hall, Fazeley, Staffs.
†Lefevre, Rt.Hon.C. Shaw, MP.	Eaton-square . .	Heckfield Pl., Hartford Bridge, Hants.
Leigh, Lord	7, Park-crescent .	Stoneleigh Abbey, Kenilworth, Warw.
Lemon, Sir C., Bt. MP., F.R.S.	. .	Carclew, Penryn, Cornwall
Ley, John Henry	4, Richmond-ter.	Trehill, Exeter

Governors.	Town Residence.	Country Residence.
Liverpool, Earl of . . .	Whitehall . . .	Pitchford Hall, Shrewsbury, Salop
†Long, Walter, M.P. . . .	29, Hill-street .	Rood Ashton, Trowbridge, Wilts.
Lovelace, Earl of	10, St. James's-sq.	Ockham Park, Ripley, Surrey
Low, William	6, Norfolk-st, Strnd	
Macclesfield, Earl of, F.R.S. .	9, Conduit-street	Sherborne Castle, Tetsworth, Oxon .
Maitland, Eben. Fuller, F.R.S.	3, Bryanstone-sq.	Henley-on-Thames, Oxon.
Maitland, Wm. Whitaker .	. .	Loughton, Essex
Mason, W. W.	. .	Linton, Cambridgeshire
Maclean, Donald, M.P. . .	24, Berkeley-sq.	King's StanleyHo, Frocester.Dursley,Gl.
Melbourne, Viscount . . .	39, South-street	Brocket Hall, Welwyn, Herts.
†Miles, Philip J.	7, Hamilton-place	Leigh Court, Bristol
†Miles, William, M.P. . . .	Ditto	King's Weston, Bristol
†Mordaunt, Sir J., Bart., M.P..	4, Eaton-place	Walton Hall, Stratford-on-Avon, Warw.
†Moreton, Lord	2, Seymour-place	Woodchester Park, Stroud, Glouc.
Morgan, Sir Chas. Gould, Bart.	70, Pall Mall	Tredegar, Newport, Monmouthshire
Morland, Thomas Thornhill .	102, Gloucester-pl.	Sheepstead, Abingdon, Berks.
†Morrison, James	57, Upp. Harley-st.	Fonthill Abbey, Hindon, Wilts.
Morton, John	. .	Chester Hill, Stroud, Glouc.
Moseley, John	. .	Glemham Ho., Saxmundham, Suffolk
Mostyn, Lord	9, Lwr Seymour-st.	Mostyn Hall, Holywell, Flintshire
Mostyn, Hon. Ed. M. Lloyd .	9, Gt. Seymour-st.	Mostyn Hall, Holywell, Flintshire
Naper, James Lennox Wm. .	. .	Lough Crew, Oldcastle, Ireland
†Neeld, Joseph, M.P. . . .	6, Grosvenor-sq. .	Grittleton House, Chippenham, Wilts.
Noel, Hon. Charles George .	11, Chandos-st, Cav.	Exton Park, Stamford, Linc.
Norfolk, Duke of, F.R.S. .	21, St. James's-sq.	Arundel Castle, Sussex
Normanby, Marquess of . .	Whitehall	Mulgrave Castle, Whitby, Yorkshire
Northampton, Marq. of, P.R.S.	145, Piccadilly .	Castle Ashby, Northampton
†Northumberland, Duke of, FRS.	Northumberlnd-ho	Alnwick Castle, Northumberland
Nurse, Wm. Mountford . .	5, Langham-pl.	Great Cell Barns, St. Albans
Page, William Woods . .	17, Wimpole-st.	
Palmer, Robert, M.P. . . .	6, Charles-street. .	Holme Park, Reading, Berks.
Patten, John Wilson, M.P. .	24, Hill-street. .	Bank Hall, Warrington, Lanc.
†Peel, Rt. Hon. Sir R., Bt., F.R.S.	Whitehall Gardens	Drayton Manor House, Fazeley, Staffs.
Pegus, Rev. P. M. . . .	. .	Uffington Hall, Stamford, Lincl.
†Pendarves, E.W., M.P., F.R.S.	36, Eaton-place .	Pendarves House, Truro, Cornwall
Penruddocke, Jno. Hungerford	35, Curzon-street	Compton Park, Salisbury, Wilts.
†Percival, John	. .	Northampton
Philips, Mark, M.P. . . .	6, Vigo-street . .	The Park, Manchester
Plowden, William	. .	Plowden Castle, Ludlow, Salop.
†Popham, General	. .	Littlecot, Hungerford, Wilts.
†Portman, Lord	18, Eaton-square	Bryanston House, Blandford, Dorset.
Price, Sir Robert, Bart., M.P.	11, Stratton-street	Foxley Hall, near Hereford
†Pusey, Philip, M.P., F.R.S. .	35, Grosvenor-sq.	Pusey, Faringdon, Berkshire
Pym, Francis	35, Clarges-street	The Hasells, Biggleswade, Beds.
†Radnor, Earl of	52, Lwr Grosvr-st.	Longford Castle, Salisbury, Wilts.
Rayleigh, Lord		Terling Place, Witham, Essex
†Richmond, Duke of . . .	51, Portland-place	Goodwood Park, Chichester, Sussex
Ripon, Earl of, F.R.S. . . .	1, Carlton Gardens	Nocton Hall, Lincoln
Rodd, Rev. Edward, D.D. .	. .	Trebartha Hall, Launceston, Cornwall
Rogerson, Joseph		
Rosebery, Earl of, F.R.S. .	139, Piccadilly .	Warren Wood, Hatfield, Hertfordshire
†Rutland, Duke of	7, Bolton-street .	Belvoir Castle, Grantham, Leicestershire
Salisbury, Marquess of . .	20, Arlington-st. .	Hatfield House, Herts.
†Sanford, Ed. A., M.P., F.R.S.	21, Queen-st, Mayfr	Nynehead Court, Wellington, Somerset.
Scarborough, Earl of . . .	41, South-st. . .	Sandbeck Castle, Bawtry, Yorkshire

Governors.	Town Residence.	Country Residence.
Seymour, Henry	39, Upp. Grosvr.-st	Knoyle House, Hindon, Wilts.
Shaw, William	7, King's-rd, Bdf-rw	
Sheffield, Earl of	20, Portland-place	Sheffield Park, Uckfield, Sussex
Sherborne, Lord	17, Hyde Park-st.	Sherborne House, Northleach, Glouc.
Sheridan, Richard Brinsley .	9, Grosvenor-sq. .	Frampton House, Dorchester, Dorset.
Shuckburgh, Sir F., Bart. FRS.	Hans-pl., Chelsea	Shuckburgh Park, Southam, Warwicksh.
†Slaney, Robt. Aglionby, M.P..	17, Suffolk-street	Walford Manor, Shrewsbury, Salop.
Smith, Jeremiah	. .	Cadbar, Rye, Sussex
†Smith, John Abel, M.P. . .	47, Belgrave-sq.	Sacombe Park, Ware, Herts.
Smith, William	. .	Prae Mill, St. Albans, Herts
†Sondes, Lord	17, St. James's-pl.	Rockingham Castle, Northamptonshire
†Spencer, Earl	27, St. James's-pl.	Althorp Park, near Northampton
Stanhope, John Spencer . .	. .	Cannon Hall, Barnsley, Yorkshire
†Stanley, Lord, M.P. . . .	8, St. James's-sq. .	Knowsley Hall, Prescot, Lancashire
Stansfield, Wm. R. C., M.P.	11, Clarges-street .	Esholt Hall, Bradford, Yorkshire
Stonor, Lord	3, Tilney-street .	Stonor Park, Henley-on-Thames, Oxon.
Stracey, Sir Edw. Bart., F.R.S.	. .	Rackheath Hall, Norwich
†Stradbroke, Earl of . . .	18, Queen-street .	Henham Park, Wangford, Suffolk
†Strutt, Edward, M.P. . . .	42, South-street .	St. Helen's, near Derby
Stuckey, Vincent	126, Sloane-street	Hill House, Langport, Somersetshire
†Sutherland, Duke of . . .	Stafford House .	Trentham Park, Newcastle-under-Lyne
†Sutton, Sir Richard, Bart. .	. .	Norwood Park, Southwell, Notts.
†Talbot, Earl, F.R.S. . . .	33, Gt. George-st.	Ingestre Hall, near Stafford
Thomas, Inigo	. .	Ratton Park, Eastbourne, Sussex
Thorald, Sir John Chas., Bart.	. .	Syston Park, Grantham, Lincolnshire
Tower, Christopher Thomas .	. .	Weald Hall, Brentwood, Essex
†Townley, Rich. Greaves, M.P.	Limmer's Hotel .	Fulbourn House, near Cambridge
Tremayne, John Hearle . .	. .	Heligan, Grampound, Cornwall
Trotter, John	. .	Horton Place, near Epsom, Surrey
Vansittart, Henry	. .	Kirkleatham, Guisborough, Yorkshire
Vavasour, Hon. Sir E. M., Bart.	. .	Haslewood Hall, Tadcaster, Yorkshire
Villebois, F.	. .	Adderbury Lodge, Kingsclere, Hants.
†Wakeman, Sir Offley P., Bart.	3, Princ.-st, Han-sq	Perdiswell Park, Worcester
Wall, Ch. Baring, M.P., F.R.S.	44, Berkeley-sq. .	Normanton Court, Stockbridge, Hants.
Watson, Hon. Richard . .	36, Davies-street .	Rockingham Castle, Northampton.
Welby, Sir Wm. Earle, Bart.	8, Upp. Belgrave-st.	Denton House, Grantham, Lincolnshire
†Wellington, Duke of . . .	Apsley House . .	Strathfieldsaye, Hartford-bridge, Hants
†Wenlock, Lord	29, Berkeley-sq. .	Escrick Hall, Selby, Yorkshire
†Westminster, Marquess of .	33, Upp. Grosv.-st.	Eaton Hall, Chester
†Whitbread, William Henry .	76, Eaton-square .	South Hill House, near Bedford
Wilbraham, G., M.P., F.R.S.	23, Brook-street .	Delamere House, Northwich, Cheshire
Williams, William, M.P. . .	31, Pall-Mall	
Williams, Rev. E. H. G. . .	. .	Marlborough, Wilts.
Wilmot, Edward Woollet . .	. .	Worksop Manor, Nottinghamshire
Wills, Benjamin	. .	Camberwell, Surrey
†Wilson, Henry	. .	Stowlangtoft Hall, Suffolk
Wilshere, William, M.P. . .	2, I, Albany . .	Walsworth Hermitage, Hitchin, Herts.
Wingate, W. B.	.	Hareby, Bolingbroke, Lincolnshire
Wood, Col. Thomas, M.P. .	4, Cavendish-sq. .	Littleton House, Staines, Middlesex
†Worsley, Lord, M.P. . . .	12, Up. Belgrave-st.	Manby Hall, Glanford Bridge, Linc.
Wright, John	6, Henrietta-st. C G	Belsize Park, Hampstead, Middlesex
Wroughton, Bartholomew .	. .	Woolley Park, Wantage, Berks.
†Yarborough, Earl of . . .	17, Arlington-st. .	Brocklesby Hall, Glanford Bridge, Linc.
Yorke, W.		
Youatt, William	. .	11, Adam's-terrace, Camden Town

LIST OF MEMBERS.

[LIFE-MEMBERS are distinguished by a mark thus †.]

Members.	Town Residence.	Country Residence.
Abbey, George	. .	Silsworth, Watford, Daventry, Northm.
Abbott, Thomas	. .	Aylesford, Kent
Ackland, Robert Fines	. .	Boulston, Haverford West, Pembroksh.
Acland, Thomas Dyke, M.P.	92, Jermyn-street	Holnicote, Minehead, Somersetshire
Acome, John	. .	Kidlington, Woodstock, Oxon.
Adcock, William	. .	Farmdish, nr. Wellingborough, Northn.
Ade, Rev. John	. .	Wensley Rectory, Bedale, Yorkshire
Adey, William	. .	Chorley, Lichfield, Staffs.
Agar, Hon. G. C.	. .	Woodstock, Oxon.
Aitken —	. .	Deeping Fen, Spalding, Lincolnshire
Albright, Nicholas	. .	Charlobury, Enstone, Oxon.
Alderman, Charles	. .	Kentbury, Newbury, Berks.
Aldridge, Robert	. .	St. Leonard's Forest, Horsham, Sussex
Aldworth, J.	. .	Frilford, Abingdon, Berks.
Aldworth, W., Jun.	. .	Frilford, Abingdon, Berks.
Alexander, Wm. Maxwell	22, Upp. Grosv.-st.	Southbar, Renfrewshire
Allen, John	. .	Liskeard, Cornwall
Allen, W.	. .	Great Hendred, Wantage, Berks.
Allin, Richard	. .	Little Moor, Oxford
Allin, Richard, Jun.	. .	Sandford, Oxford
Allix, Charles	. .	Willoughby, Alford, Lincolnshire
Allpress, R. W.	. .	Burleigh Hill, St. Ives, Hunts.
Almack, John, Jun.	. .	Leckonfield Park, Beverley, Yorkshire
Almack, Thomas	. .	Bishop Burton, Beverley
Almack, Barugh	10, Whitehall-pl.	
Alywin, William	. .	Thatcham, Newbury, Berks.
Ambrose, ——		
Anderson, Robert	. .	Cirencester, Gloucestershire
Anderson, William	. .	Oakley, Bedford
Andrews, Benjamin	. .	Chartham, Canterbury, Kent
Andrews, Edwin	. .	Shroton, Blandford, Dorsetshire
Annesley, Arthur	89, Eaton-square	Bletchington Park, Woodstock, Oxon.
Annesley, Rev. Charles	. .	Eydon, near Daventry, Northamp.
Ansell, William	. .	Wantage, Berks.
Arbuthnot, Rt. Hon. Charles	. .	Woodford Lodge, Thrapston, Northamp.
†Archbold, Robert, M.P.	55, Jermyn-street	David's Town, Castledermot, Ireland
Archer, William	. .	Horningsham, Warminster, Wilts.
Arkwright, Charles	. .	Dunstall Lodge, Burton-on-Trent, Staff.
Arkwright, Rev. Joseph	. .	Mark Hall, Harlow, Essex
Arnatt, Jonathan	. .	Leer, Witney, Oxon.
Arnitt, G.		
Arnot, David Gale	. .	Wyfold Court, Henley-upon-Thames
Arnott, George	. .	Tingewick, Buckingham
Ashdown, John M.	. .	Uppington, Shrewsbury, Salop.
Ashhurst, William Henry	. .	Waterstock House, Wheatley, Oxon.
Ashhurst, W. H., Jun.	. .	Waterstock House, Wheatley, Oxon.
†Astbury, William	62, High-st, Cam. T	

Members.	Town Residence.	Country Residence.
Aston, Samuel	. .	Compton House, Newcut, Gloucester
Atkins, E. Martin	. .	Kingston-Lisle, Wantage, Berks.
†Atkinson, William James	. .	Marlow, Buckinghamshire
Atterbury, H. S.	. .	Woburn, Bedfordshire
Austen, Colonel	. .	Seven Oaks, Kent
Austin, L. S.	. .	The Warren, Wootton-under-Edge
Aylmer, Robert	. .	Fincham Hall, Fincham, Norfolk
Bacon, James	. .	Pluckley, Charing, Kent
Badcock, Benjamin	. .	Broad-street, Oxford
Badcock, John	. .	Radley, Abingdon, Berks.
Baden, Andrew	. .	Long street, Pewsey, Wilts.
Badham, G. D.	. .	Waldringfield, Woodbridge, Suffolk
Bailey, Charles	. .	Abingdon, Berks.
Bailey, William James	. .	Shenley House, Stony Stratford, Bucks
Bailey, J.	. .	Shirley House, Stony Stratford, Bucks
Bailey, William	. .	Hursley, Winchester, Hants.
Baillie, W. H.	33, Cavendish-sq.	Duntisbourne, Cirencester, Gloucestersh.
Bailward, John	. .	Horsington, Wincanton, Somersetshire
Baines, John	8, Cleveland-row .	Goosnargh, Preston, Lancashire
Baines, John Fuller	. .	Stisted, near Braintree, Essex
Baker, Robert	. .	Writtle, Chelmsford, Essex
Baker, Richard W.	. .	Cottesmore, Oakham, Rutlandshire
Baker, Sir Edw. Baker, Bart.	. .	Ranston House, Blandford, Dorset.
Baker, T. Barwick	. .	Hardwick Court, Gloucester
Baker, Rev. Richard Henry	. .	Linchmere, Hazlemere, Sussex
Baker, Thomas	. .	Little-Rollright, Chipping-Norton, Oxon
Baldwyn, Stephen	. .	Ashton-Underhill, Gloucestershire
Ballard, Rev. J.	. .	Cropredy, Banbury, Oxon.
Bannerman, A.	. .	Chorley, Lancaster
Banting, James	. .	Oxford
Barber, Richard	. .	Charlton, Tetbury, Gloucestershire
Barclay, William	. .	Haseley, near Warwick
Barclay, J. P.	. .	Wickham Market, East Suffolk
Barker, Field Dunn	. .	Cambridge
Barker, George Raymond	. .	Fairford Park, Fairford, Gloucestersh.
Barlow, Rev. G. F.	. .	Burgh, Woodbridge, Suffolk
Barnard, Edward George, M.P.	. .	Gosfield Hall, Essex
Barnard, F.	. .	Wantage, Berks.
Barnard, Richard	. .	Pusey, near Faringdon, Berks.
†Barneby, William	. .	Chater Park, Bromyard, Herefordshire
Barnett, Charles	. .	Stratton Park, Biggleswade, Beds.
Barnett, Joseph	. .	Remenham Hill, Henley-on-Thames
Barrett, Thomas	. .	Tatsfield Court, Westerham, Kent
Barrington, Viscount, M. P.	34, South-street .	Beckett House, Faringdon, Berks.
Barter, Rev. C.	. .	Sarsden, Chipping-Norton, Oxon.
Barthropp, Nathaniel	. .	Cretingham, nr. Framlingham, Suffolk.
Bartlett, William	. .	Whatcombe, Blandford, Dorset.
Bartlett, Isaac	. .	Haws, Brackley, Northamptonshire
Bartlett, John	. .	Haws, Brackley, Northamptonshire
Barton, Thomas	. .	Threxton, Watton, Norfolk
Barton, John	. .	Lee, Havant, Hampshire
Barton, Nathaniel	. .	Corsley House, Warminster, Wilts.
Barugh, William	. .	Beeford, Bridlington, Yorkshire
Bateman, Henry	. .	Rickmansworth, Herts.
Bateman, Thomas, M.A.	6, Raym.bds. G.In.	Guilsborough, Northamptonshire
Bates, Thomas	. .	Kirkleavington, Yarm, Yorks.
Bates, Thomas Ellis	. .	Fittleton, Amesbury, Wilts.
Bathurst, Earl	8, John-st, Berk.-sq	Oakley Park, Cirencester, Glouc.

Members.	Town Residence.	Country Residence.
Bathurst, Hon. William L.	7, Half-moon-st.	
Batley, John		
Batt, E. A.	. .	Witney, Oxfordshire
Bawldry, Charles	. .	Hasketon, Woodbridge, Suffolk
Bawtree, John	. .	Sayer, Colchester, Essex
Baxter, Robert	. .	Doncaster, Yorkshire
Bayley, C. B.		
Bayne, William	. .	Oxford
Beach, Sir Mich. Hicks, Bart.	20, Portman-sq.	Williamstrip Park, Fairford, Gloucest.
Beach, John	. .	Redmarley, Stroud, Gloucester.
Beadel, James	. .	Witham, Essex
Beales, Charles	. .	Shelford, Cambridgeshire
Beales, Patrick	. .	Cambridge
Beard, Rev. James	. .	Cranfield, Woburn, Bedfordshire
Beasley, John	. .	Brampton, Northamptonshire
Beasley, T. Calvert	. .	Harston, Grantham, Lincolnshire
Beaufort, Henry	. .	Holme, Biggleswade, Bedfordshire
Beaumont, E. B.	. .	Firmingley, Bawtry, Nottinghamshire
Beck, William	. .	Mileham, East Dereham, Norfolk
Beck, Edward	. .	Harpley, Castle Rising, Norfolk
Beckett, W.	. .	Kirkstall Grange, Leeds, Yorkshire
Beckford, William	36, Finsbury circus	
Bedford, John	. .	Boughton House, Lincolnshire
Beldam, Valentine	. .	Royston, Hertfordshire
Beman, Robert	. .	Donnington, Moreton-in-Marsh, Glouc.
Bennett, James	. .	Cadbury House, Castle Carey, Somers.
Bennett, Joseph	. .	Tempsford, Biggleswade, Beds.
Bennett, Samuel	. .	Bickerings Park, Woburn, Beds.
Bennett, Thomas	. .	Woburn, Beds.
Bennett, Thomas	. .	Chaddlesworth, Wantage, Berks.
Bennett, William	. .	Lewsey, near Luton, Beds.
Bennett, W.	. .	Syde, Cirencester, Gloucestershire
†Benson, Rev. Henry B.	. .	Utterby House, Louth, Lincoln.
Benson, John	. .	Tavistock, Devon.
Bentley, Thomas	. .	Hermitage, Rochester, Kent
Best, Rev. T.	. .	Kirby-on-Bain, Horncastle, Lincoln.
Bethell, Henry	. .	Enford, Pewsey, Wilts.
Bethune, Edward Drinkwater	80, Chester-square	
Bethune, Rev. G.	. .	Worth Rectory, Crawley, Cuckfield, Sus.
Bethune, John Drinkwater	. .	Thorncroft, Leatherhead, Surrey
Bettridge, Henry	. .	East Hanney, Abingdon, Berks.
Bettridge, R. H.	. .	Milton Hill, Abingdon, Berks.
Betts, William	. .	Church Farm, Stow Bardolph, Norfolk
Bicheno, Jas. Ebenezer, F.R.S.	. .	Ty-Maen, Pyle, Glamorganshire
Bigg, Thomas	15, Crawford - st.	
Binns, Jonathan		
Birch, George W.	. .	Roxholme, near Sleaford, Lincolnshire
Bird, John	. .	Shouldham Abbey, Shouldham, Norfolk
Birks, John	. .	Herringfield
Birnie, John Richard	8, St. Martin's-pl.	Euston Farm, near Bagshot
Birt, Jacob	12, Myddleton-sq.	
Bisshopp, John	. .	Westburton, Petworth, Sussex
Blackbourn, David	. .	Temple Brewer, Lincolnshire
Blackett, Henry	. .	Stockburn, Darlington, Durham
Blackford, Richard	. .	Malmesbury, Wilts.
Blagrove, Edward	. .	Magdalen College, Oxford
†Blair, John	18, Calthorpe - st.	Moseley Lodge, Welford
Blake, Nathaniel	. .	Stanton-Harcourt, Ensham, Oxon.
Blakesley, Rev. Jos. W., M.A.	. .	Trinity College, Cambridge
Blanch, Gustavus William	Storey's Gate	

Members.	Town Residence.	Country Residence.
Bland, Thomas, M.D.	. .	Melton, Woodbridge, Suffolk
Bland, William	. .	Hartlip, Sittingbourne, Kent
Blandy, Adam	. .	Kingston House, Abingdon, Berks.
Blandy, T.	. .	Kingston, Bagpuze, Abingdon, Berks.
Blandford, Marquess of	5, York-st. St. Jas.	Howbury, Beds.
Blexam. W.	. .	Moditonham, Devonport
†Bliss, Rev. Philip, D.D.	. .	Oxford
Blunt, Edward Walter	. .	Kempshott, Park, Basingstoke, Hants.
Blurton, William	. .	Field Hall, Uttoxeter, Staffordshire
Blyth, H. E.	. .	Burnham-Westgate, Norfolk
Boards, William	. .	Edmonton, Middlesex
Boby, Charles	. .	Finborough, Stowmarket, Suffolk
Bodley, John	. .	Stockleigh, Crediton, Devon.
Bolton, Lord	25, Berkeley-sq.	Hackwood Park, Basingstoke, Hants.
Booth, John	. .	Killerby, Catterick, Yorkshire
Boringdon, Viscount	. .	Kent House, Knightsbridge, Middlesex
Bortlett, William	. .	Great Bedwin, Wiltshire
Bosanquet, G. J.	. .	Broxbournbury, Hoddesden, Herts.
†Botfield, Beriah	. .	Norton Hall, Daventry, Northamptonsh.
Botfield, Thomas	. .	Hopton Court, Cleobury-Mortimer, Salp.
Botfield, William	. .	Decken Hill, Shiffnal, Salop.
Botley, John	. .	Stockleigh, Crediton, Devon.
†Bourchier, Charles	66, Wimpole-street	
Bourne, George	. .	Halton, Spilsby, Lincolnshire
Bouverie, Edward	. .	Delapre Abbey, Northampton
Bowley, David	. .	Cirencester, Gloucestershire
Bowley, E.	. .	Cirencester, Gloucestershire
Bowley, William	. .	Cirencester, Gloucestershire
Bowman, C.		
Boys, Henry	. .	Waldersham, Dover, Kent
Boys, R.	. .	Eastbourne, Sussex
Boys, Edward	. .	Alkerton, Banbury, Oxon.
Brackenbury, John.	. .	Thorpe Hall, Shouldham Thorpe, Norf.
Bradford, Edward	. .	Beaconsfield, Bucks.
Bradley, Edward	. .	Traduff, Cowbridge, Glamorganshire
Brailsford, Thomas	. .	Barkwith, Wragby, Lincolnshire
Braine, Robert	. .	Oxford
Braithwaite, Garnet	. .	Plumtree Hall, Milnthorpe, Westmorld.
Brenner, W.		
Bretingham, T. C.	. .	Brockdish, Harleston, Norfolk
Brettell, Richard	. .	Finstall, Bromsgrove, Worcestershire
Brewitt, Thomas	. .	Rayleigh, Essex
Breynton, John	. .	Haunch Hall, Lichfield, Staffordshire
Bridge, Thomas	. .	Buttsbury, Ingatestone, Essex
†Bright, J.	. .	Teddesley Pk. Farm, Penkridge, Staffs.
Bristow, S. E.	. .	Burthorp House, Newark, Notts.
Broadwood, J. S.	. .	Lyne, Dorking, Surrey
Brockman, Frederick	. .	Underhill, Hythe, Kent
Bromhead, Benjamin	. .	Lincoln
Bromley, R. Madox	Colonial Club	
Bromwell, Rev. R.	. .	Pembroke College, Oxford
†Brooke, Sir Richard, Bart.	. .	Norton Priory, Runcorn, Cheshire
Brookes, John	. .	Burton, Much-Wenlock, Salop
Brooks, John	. .	Hatford, Faringdon, Berkshire
Brooks, T.	. .	Croxby, Cambridgeshire
Brooks, Bernard	. .	Lyford, Wantage, Berkshire
Brown, Charles	. .	Redbourn, St. Alban's, Hertfordshire
Brown, Davies	. .	Markham Hall, Shouldham, Norfolk
Brown, Francis	. .	Welbourne, Sleaford, Lincolnshire
Brown, George	. .	Avebury, Marlborough, Wiltshire

Members.	Town Residence.	Country Residence.
Brown, George	. .	Avebury, Marlborough, Wiltshire
†Brown, Rev. H.	. .	Burton, Sleaford, Lincolnshire
Brown, J.	. .	Pamphill Ho., Wimborne Minster, Dors.
Brown, John	. .	Compton, Ibsley, Ringwood, Hants.
Brown, Joseph	. .	Church Farm, Wimbotsham, Norfolk
Brown, Rev. Robert . . .	. .	Kidlington, Woodstock, Oxon.
Brown, T.		
Brown, Thomas	. .	Bartenbury Ho., Cirencester, Glouces.
Brown, Thomas	. .	South Fairly, Wantage, Berkshire
Brown, William	. .	Tring, Hertfordshire
Browne, John	11, O. Cavendish-st	Chisledon, Marlborough, Wiltshire
Browne, Rev. Robert		
Browne, W. R.	. .	Chisledon, Marlborough, Wiltshire
Browning, Jonathan . . .	. .	Oxford
Brunner, William	. .	Oxford
Bryant, William	. .	Newmarket, Cambridgeshire
Bubb, Anthony	. .	Whitcombe, Gloucestershire
Buchan, James.	. .	Franch, near Kidderminster, Worcest.
Buci, Richard	. .	Bridge Place, Canterbury, Kent
Buckland, Rev. W., D.D., F.R.S.	. .	Christchurch, Oxford
Buckley, John	. .	Normanton Hill, Loughborough, Leic.
Budd, Captain H., R. N. . .	. .	Winterbourne Basset, Marlbro', Wilts.
Bulford, Thomas	. .	Studley, Oxford
†Buller, John	. .	Morsal, Looe, Cornwall
†Bullock, Ferdinand . . .	. .	East Challow, Wantage, Berkshire
Bulwer, William Lytton . .	. .	Heydon Hall, Aylsham, Norfolk
Bunnett, Thomas		
Burd, Timotheus	. .	Whiston Priory, Salop.
Burder, D.	. .	Abingdon, Berkshire
Burford, Thomas		
Burgess, Robert	. .	Winterborne Bassett, Blandford, Dors.
Burke, French	10, Gt. James-st, B.r	
Burn, Ilderton	21, Connaught-sq.	
Burnand, William	. .	Norton, Chichester, Sussex
Burness, C.	. .	Woburn Abbey, Bedfordshire
Burrows, T., Jun.	. .	Headdington, Oxford
Burt, Thomas	. .	Iwerne, Blandford, Dorsetshire
Burt, William	. .	Witchampton, Wimborne-minster, Dst.
Burt, A.	. .	Witchampton, Wimborne-minster, Dst.
Burt, George	. .	Witchbury, Wiltshire
Burton, Launcelot Archer .	. .	Grove End House, St. John's Wood
Burtt, James	. .	Clenston
Bury, John W.	20, Devon.-st, Pt.-pl	
Bush, John	. .	Park Farm, Stow Bardolph, Norfolk
Butcher, W.	. .	Standish, Stroud, Gloucestershire
Butler, Thomas, jun. . . .	. .	Hatfield-Peveril, Essex
Butterfield, Charles Cotton .	. .	Petersfield, Hampshire
Butterfield, John	. .	Halse, Brackley, Northamptonshire
Cadle, Joseph	. .	Westbury-on-Severn, Gloucestershire
†Calcraft, John Hales, M.P. .	12, Carlton-terrace	Corfe Castle, Dorset.
†Caldecott, Thomas	. .	Rugby Lodge, Rugby, Warwickshire
Caldecote, R. M.	. .	Eastbourne, Sussex
Caley, Digby	. .	Ripon, Yorkshire
Calhoun, Walter F.	. .	Binderton, near Chichester, Sussex
Callum, Joseph	. .	Pattingham, Wolverhampton, Staffs.
Calthorp, Richard	. .	Swinehead Abbey, Boston, Lincolnshire
Calverley, Thomas	1, Regent-street	Ewell House, Ewell, Surrey
Calvert, Edmund	. .	Hunsdon, Ware

Members.	Town Residence.	Country Residence.
Calvert, Colonel Felix . . .	. .	Hunsdon House, Ware, Herts.
†Calvert, Frederick	6, St. James's Pla.	
Calvert, John W., M.D. . .	11, Blandf.-pl.R.P.	
Calvert, N.	. .	Hunsdon, Ware, Herts.
Cannon, J. S.	. .	Beckley, Oxford
Capel, William	. .	Grove, Stroud, Gloucestershire
Capper, Mrs.	. .	Hailsham House, Hailsham, Sussex
†Carew, W. H. Pole . . .	. .	Antony House, Devonport, Devon.
Carlisle, The Lord Bishop of .	15,Grosvenor-street	Rose Castle, Wigton, Cumberland
Cary, Rev. H.	. .	Cowley House, near Oxford
Carnegie, Rev. J. . . .	. .	Seaford, Sussex
Carrington, Lord	. .	The Abbey, High Wycombe, Bucks.
Carrington, Geo., Jun. . .	. .	The Abbey, Great Missenden, Bucks.
Carter, John Bonham . . .	. .	Ditcham Grove, Petersfield, Hants.
Carter, J. Thomas	. .	Hunstanton, Lynn, Norfolk
Carter, J. R.	. .	Spalding, Lincolnshire
†Cartwright, Thomas W. . .	. .	Ragnall Hall, Newton, Newark, Notts.
Casson, —	. .	Ditchley Park, near Woodstock, Oxon.
Casswell, Thomas	. .	Poynton, near Lincoln
Castle, Benjamin	. .	Oxford
Castree, J.	. .	Gloucester
Catlin, Thomas W. . . .	. .	Chillesford, Orford, Suffolk
†Cator, Rev. Thomas . . .	. .	Skelbrooke Park, Doncaster, Yorksh.
Caudwell, William . . .	. .	Drayton, Abingdon, Berks.
Cavendish, Hon. Geo. H., M.P.	. .	Ashford Hall, Bakewell, Derbyshire
Cayley, Ed. Stillingfleet, M.P.	. .	Wydale, Malton, Yorkshire
Chamberlain, Henry . . .	. .	Desford, Leicestershire
Champion, Thomas A. . .	. .	Sarr, Thanet, near Canterbury, Kent
Chandler, Thomas . . .	. .	Stockton-upon-Tees, Durham
Chapman, Thomas . . .	. .	Stoneleigh, Coventry, Warwickshire
Chapman, Thomas		
Chapman, George	3,Arundel-st., Strd.	
Charge, Thomas	3,Arundel-st., Strd.	Barton, Darlington, Durham
Charlton, Thomas Parfect . .	. .	Tonbridge, Kent
Chase, William, jun. . . .	. .	Weston, Petersfield, Hants.
Chaundy, Richard . . .	. .	Oxford
Chawner, Richard Croft . .	. .	Wall, Lichfield, Staffordshire
Cherry, George Henry . .	. .	Denford, Hungerford, Berks.
Chichester, J. P. Bruce, M.P.	24,Chester-st.Gr.p	Arlington House, Barnstaple, Devon.
Chillingworth, William . .	. .	Cuddesden, Tetsworth, Oxon.
Chisman, John	. .	Stockton-upon-Tees, Durham
†Cholmeley, Sir Mont. J., Bart.	. .	Easton Hall, Coltersworth, Lincolnshire
Chrisp, Thomas	. .	Hawk Hill, Alnwick, Northumberland
Christie, Langham . . .	. .	Preston Deanery, Hackleton, Northam.
†Chrystie, William	20,Chester-tr.R.pk	
Church, Robert	. .	Bishopstoke, Westbury, Wiltshire
Chute, W. Wiggett . . .	. .	Pickenham Hall, Swaffham, Norfolk
Clapham, —	. .	Lay Hill Common, Chesham, Bucks.
Clark, Joseph	. .	Maidenhead, Berkshire
Clarke, C. J.	. .	Egham, Surrey
Clarke, Joseph, Jun. . . .	. .	Ashby, Sleaford, Lincolnshire
Clarke, K.	35,Southampt.-bls.	
Clarke, Rev. C.	. .	Henstead, Beccles, Suffolk
Clarke, Edward	. .	Canwick, near Lincoln
Clarke, Rev. John . . .	. .	Chertsey, Surrey
Clarke, John	. .	New Parks, near Leicester
Clarke, Thos. E.	. .	Chard, Somersetshire
Clarke, Richard	. .	Baldon, Oxford
Clay, William, M.P. . . .	. .	Fulwell Lodge, Twickenham, Middlsx.
Clayden, John	. .	Littlebury, Saffron Walden, Essex

Members.	Town Residence.	Country Residence.
Cleeve, Henry	. .	Rettendon, Wickford, Essex
Clements, Viscount, M.P.	2, Grosvenor-sq.	Rynn, Mohill, Leitrim, Ireland
Clifton, Capt. T.		
Clinch, J. W.	. .	Witney, Oxfordshire
Clode, William	. .	Bakeham House, Egham, Surrey
Close, John	. .	Great Linford, Newport Pagnell, Bucks.
Clutton, John	8, Parliament-st.	
Clutton, Robert	8, Parliament-st.	Hartswood, Reigate, Surrey
Cobb, Henry	18, Lincoln's-Inn F	
Cobb, Robert	. .	Town Place, Faversham, Kent.
Cobb, Timothy Rhodes	. .	Banbury, Oxon.
Codrington, O. Calley	. .	Wroughton, Swindon, Wiltshire
†Colebrooke, Sir Jas. E., Bart.	. .	Colebrooke Park, Tonbridge, Kent
Coles, James	. .	Stratton-Audley, Bicester, Oxon.
Collett, Russell,	. .	The Jungle, near Lincoln
Collingwood, J. V.	. .	Abingdon, Berkshire
Collins, Rev. T. F.	. .	Betterton, Wantage, Berkshire
Cole, Richard John		Chertsey, Surrey
Collard, Edwin	. .	Chislett Park, Chislett, Kent
Collard, Thomas W.	. .	Canterbury, Kent
Collyer, Rev. —	. .	Holkham, Norfolk
Colville, Frederick		
Colvin, B. B.	. .	Monkhams Hall, Waltham Abbey, Esx.
†Compton, Henry Combe, M.P.	16, CarltonHo.-ter.	Minstead Manor Ho., Lyndhurst, Hants
Compton, Richard	. .	Eddington, Hungerford, Berks.
Connop, H., Jun.		
Cook, Rev. Joseph George	. .	Purley Hall, near Reading, Berkshire
Cook, John	. .	Down-Ampney, Cirencester, Glouc.
Cook, John	. .	Hothorpe, Welford, Northamptonshire
Cook, Rev. T. L. B.	. .	Oxford
Cooke, Layton	12, Pall Mall	
†Cooke, P. Davies	. .	Owston, near Doncaster, Yorkshire
Cooke, Rev. T. L.	. .	Beckley, near Oxford
Cooling, John	. .	Lower Winchindon, Thame, Oxon.
Cooper, Isaac	. .	The Bucklands, Bury-St.-Edmund's, Suff
Cooper, J. G.	. .	Blythburgh, Southwold, Suffolk
Cooper, Samuel	. .	Henley-on-Thames, Oxon
Cooper, Thomas	. .	Norton, Seaford, Sussex
Cooper, Thomas	. .	Swineshead, Lincolnshire
Cooper, W. D.	. .	Highgate, Middlesex
Copeland, Joseph	. .	Abingdon, Berkshire
Copeland, William	. .	Abingdon, Berkshire
Cormack, William	Covent Garden	
Cormack, William John	Covent Garden	
Cornish, Rev. J. J.	. .	Kenwyn, Truro, Cornwall
Corrance, Frederick	. .	Loudham Park, Woodbridge, Suffolk
Corrie, Adam	. .	Wellingborough, Northamptonshire
Cother, William	. .	Middle Aston, Woodstock, Oxon.
Cottam, George	Winsley-st., Oxf.-s.	
Cotterell, Sir J. Geers, Bart.,	. .	Garnons, near Hereford
Cottingham, L. O.	. .	Reydon, Southwold, Suffolk
Courtney, W.	. .	Newton-Stacey, Whitchurch, Hants.
Coverdale, John	1, Field-ct. Gr's I.	Oak Lodge, Kilburn, Middlesex
Couling, Charles	. .	Rye Farm, Abingdon, Berks.
Coyney, W. Hill	. .	Weston Coyney, Lane End, Staffs.
Cozens, Daniel G., Jun.	. .	Bickenhall, Taunton, Somerset.
Cradock, Sheldon	. .	Hartforth Hall, Richmond, Yorkshire
Cragg, William	. .	Threckingham, Folkingham, Lincolns
Cramp, John M.	. .	St. Peter's, Isle of Thanet, Kent
Cramp, John	. .	Gurlinge, Margate, Kent

Members.	Town Residence.	Country Residence.
Cripps, Edward	. .	Cirencester, Gloucestershire
Cripps, Joseph, M.P. . . .	. .	Cirencester, Gloucestershire
Cripps, Thomas	. .	Oxford
Cripps, Raymond	. .	Cirencester, Gloucestershire
†Crisp, Thomas	. .	Gedgrave Hall, Orford, Suffolk.
Croft, Sir John, Bart., F.R.S..	45, Brook-street .	Cowling Hall, Yorkshire
Crofton, Thomas	. .	Holywell, Durham
Crompton, John Bell . . .	. .	Milford, near Derby
Croome, James	. .	Acton Hall, Berkeley, Stroud, Glouc.
Cross, W. J.		
Crosse, Henry	. .	Boyton Hall, Stowmarket, Suffolk
Crosse, James	. .	Gingley, Retford, Notts
Crouch, A. W.	. .	Ridgmount, Woburn, Bedfordshire
Crowdy, Richard	. .	Faringdon, Berkshire
Cubley, Samuel	. .	Quarrington, Sleaford, Lincolnshire
†Cure, Capel	2, Devonshire-pl.	Blake Hall, Ongar, Essex
Currie, Henry	29, Cornhill . .	West Horsley Pk., Leatherhead, Surrey
Currie, Edmund	. .	Oakley House, Abingdon, Berkshire
Currie, Raikes, M.P. . . .	4, Hyde Park-ter.	
Curteis, Herbert B. . . .	19, Bridge-st., Wstr	Peasemarsh, Rye, Sussex
Curtis, Adml. Sir Lucius, Bart.	. .	Gatcombe House, Portsmouth, Hants.
Dadds, John, sen.	. .	Wingham, Kent
Dadds, John, Jun. . . .	. .	St. Nicholas, Thanet, Kent
Darlington, Earl of . . .	40, Upp. Brook-st.	
Dashwood, Francis . . .	9, Seymore-place	Halcot, Bexley, Kent
Dashwood, Rev. Samuel Vere .	. .	Stanford, Loughborough, Leic.
Daubeny, Chas., M.D., F.R.S.	. .	Oxford University
Davey, George	. .	Dorchester, near Benson, Oxfordshire
Davey, William	. .	South Park, Headon, Hull, Yorks.
Davenport, George . . .	. .	Oxford
David, Evan	. .	Radyr Court, Cardiff, Glamorganshire
Davies, Evan	. .	Paton, Wenlock, Salop
Davies, D. Saunders . . .	United Univ. Club	Pentre, Newcastle,—Emlyn, Caermartn
Davies, Rev. Thomas . . .	. .	Jesus' College, Oxford
Davies, W. H.	Church-st., Chels.	
Davis, Hewitt	Haymarket .	Spring Park, Croydon, Surrey
Davis, John	. .	Banbury, Oxfordshire
Davis, William	. .	Bicester, Oxfordshire
Davis, William	202, Strand	
†Davis, Samuel	. .	Swerford Park, Banbury, Oxon.
†Davis, Richard	St. Helen's-place	Skeynes, Edenbridge, Seven Oaks, Kent
Davison, Crawford . . .	. .	Pierepoint, Farnham, Surrey
Davison, Thomas	. .	Durham
Dawson, Edward E. . . .	. .	Ingthorpe, Stamford, Lincolnshire
Dawson, Edward	. .	Aldcliffe Hall, Lancaster
Day, Isaac	. .	Northleach, Gloucestershire
Dean, Rev. Edmund N. . .	. .	Alderleys, near Gloucester
Dean, James	248, High Holborn	The Yews, Tottenham, Middlesex
Deane, Ralph	. .	Escourt House, Reading, Berks.
Deare, Thomas	. .	Longworth, Great Faringdon, Berks.
Dearlove, John	. .	Brightwell, Wallingford, Berks.
Deedes, William	. .	Sandling, Hythe, Kent
†Denbigh, Earl of	.	Newnham Paddock, Lutterworth, Leic.
Dennis, Robert	. .	Greetham, Horncastle, Lincolnshire
Dent, Joseph	. .	Ribsten Hall, Wetherby, Yorkshire
Denton, Thomas	. .	Lew, Bampton, Oxfordshire
De Visme, Rev. James . .	. .	Bath, Somersetshire
Devon, Earl of	4, Bryanstone-sq.	Powderham Castle, Exeter, Devon.

Members.	Town Residence.	Country Residence.
Dewe, Thomas		
†Dewing, R.		Carbrooke, Watton, Norfolk
†Dickens, Charles Scrace		West Stoke, Chichester, Sussex
Dickson, Robert		East Wickham, near Welling, Kent
Dilke, Captain, R.N.		Maxstoke Castle, Coleshill, Warwicksh.
Dillon, Viscount		Ditchley Hall, near Woodstock, Oxon
†Divett, Edward, M.P.	20, Chpl.-st, Grov-pl	Bystock, Exmouth, Devon.
Dixon, Charles		Stanstead Park, Chichester, Sussex
Dixon, E.		Ashwood House, Dudley, Worcestersh.
Dixon, George		Oxford
Dixon, Henry		Witham, Essex
Dixon, Henry		Oxford
Dixon, Robert Walker		Wickham Bishops, Witham, Essex
Dobito, George		Kirtling Hall, Newmarket, Cambridges
Dodd, George		Chenies, Rickmansworth, Herts.
Dodd, W. J., Jun.		Checkendon, Wallingford, Oxfordshire
Dodds, Thomas		Standish Hall, Wigan, Lancashire
Dolphin, J.		Swafield, North Walsham, Norfolk
Donaldson, John Strangeways	15, Southmp.-st, Str.	
Dormer, C. C.		Rousham, Woodstock, Oxon.
Dormer, W.		East Hanney, Abingdon, Berks.
Drake, C. B.		
Drake, T. T.		Shardloes, Amersham, Bucks.
†Drax, J. S. W. S. Erle		Charborough Park, Blandford, Dorset.
Drewett, Thomas		Guildford, Surrey
Drewett, Thomas, jun.		Guildford, Surrey
Drewitt, Robert		Peppering, Arundel, Sussex
Driver, Edward	Richmond-tr, Wh.	Vassall Road, North Brixton, Surrey
Driver, George N.	Richmond-tr, W h.	
Druce, Samuel		Ensham, near Oxford
Druce, Joseph		Ensham, near Oxford
†Drummond, Andrew Robert	2, Bryanstone-sq.	Cadland, Nw. For, Southampton, Hants
Drury, George		Eastbourne, Sussex
Duckworth, John		Barnet, Herts.
Duff, A.		Woodcot Ho., Henley-on-Thames, Oxon.
Duffield, Christopher		Grantham, Lincolnshire
Duke, Charles		East Lavant, Chichester, Sussex
Duke, Henry		Earnley, Chichester, Sussex
Dunn, Thomas		Kintbury, Newbury, Berks.
Dunning, Ralph		Bishop's Burton, Beverley, Yorkshire
Dyer, George		East Tisted, Alton, Hants.
Dyke, Rev. H. S.		Polynt, Cornwall
Dymoke, Hon. Champion	10, Whitehall-pl.	Scrivelsby Court, Horncastle, Lincolnsh.
Eale, W. H. B.		Holton Park, near Oxford
Eames, John		Ashby-de-la-Zouch, Leicestershire
Edgell, Edgell Wyatt		Milton Place, Egham, Surrey
Edgington, Benjamin	Duke-st. Southwrk.	
Edmonds, Albert		Inglesh, Lechlade, Gloucestershire
Edmonds, William		Kilmscott, Lechlade, Gloucestershire
Edwardes, Hon. George		Noyadd Llanarth, Aberyron
Edwardes, Hon. William		Edmondthorpe, Oakham, Rutlandshire
Edwards, John		Oxford
Edwards, Frederick	1, Stafford-pl. Pim.	Barnham, Thetford, Norfolk
Edwards, E.		
Edwards, Henry		Sutton, Woodbridge, Suffolk
Edwin, John		Sheriff's Linch, Worcestershire
†Elliott, John		Chapel Brampton, near Northampton
Ellis, John, M.P.	5, Hereford-st, P.L.	

Members.	Town Residence.	Country Residence.
Ellison, Michael	. .	Sheffield, Yorkshire
Ellison, William	. .	Syzergh Castle, Kendal, Westmoreland
Ellman, Rev. H. J.	. .	Charlton Rectory, Bedford
Ellman, John	. .	Glynde, Lewes, Sussex
Ellman, R. H.	. .	Glynde, Lewes, Sussex
Ellman, Thomas	. .	Beddigham, Lewes, Sussex
Elphick, William	. .	Steyning, Sussex
Elton, George	. .	Redland, near Bristol
Elwood, Lieut. Col. C. W. .	. .	Clayton Priory, Brighton, Sussex
Enley, William	. .	Oxford
Ensworth, Thomas	. .	Oxford
Enys, John Samuel	. .	Enys, near Penryn, Cornwall
Erle, Rev. Christopher . .	. .	Hardwicke, Aylesbury, Bucks.
Etches, J. C.	. .	Liverpool
Etwall, William	. .	Penton, Andover, Hants
Evans, Richard	. .	Tyn Park, Cardiff, Glamorganshire
Evans, Rev. W.	. .	Pusey, Faringdon, Berkshire
Evans, W.	. .	Hackney, Middlesex
Evans, Isaac Pearson . . .	. .	Evans Griff, Coventry, Warwickshire
Eve, Richard	. .	Silsoe, near Bedford
Everitt, Isaac	6, Torrington-sq.	South Creak, Fakenham, Norfolk
Ewen, Thos. L'Estrange . .	. .	Dedham, Essex
Eyston, Charles	. .	Hendred, Wantage, Berkshire
Eytre, William	. .	Stanton, Shiffnal, Salop
Fairthorne, Henry	. .	Brightwell, Wallingford, Berks.
Faithful, Rev. G.	. .	Lower Heyford, Bicester, Oxon.
Fane, J.	. .	Wormsley, Stoken-Church, Oxon.
Fardell, John	. .	Lincoln
Farmer, Edward	. .	Fazeley, Tamworth, Staffordshire
Farrer, Rev. Richard	. .	Ashley, Rockingham, Northampt.
Farrow, Benjamin B.	. .	Ipswich, Suffolk
Farrow, W.	. .	Market Rasen, Lincolnshire
Faulkner, Wm.	. .	Burford, Oxfordshire
Faulkner, John	. .	North-Hinksey, near Oxford
Faulkner, Thomas	. .	Queenford, Dorchester, Dorset.
Faux, Joseph	. .	Cold-Ashby, near Northampton
Fawcett John William . .	. .	Sedbergh, Yorkshire
Fearon, —, Sen.		
Feilden, William, M.P. . . .	14, Hanover-st.	Feniscowles, Blackburn, Lancashire
Fernie, William	. .	Woodchester, Stroud, Gloucestershire
Field, William	. .	Ulceby, Barton, Lincolnshire
Fielden, Joseph	. .	Whillen, Blackburn, Lancashire
Fiennes, Hon. Wm. Twisleton	1, D, Albany	Broughton Castle, Banbury, Oxfordsh.
Filliter, George		
Finch, Richard	. .	Headington, near Oxford
Finlayson, Dr.	. .	Cheltenham, Gloucestershire
Fisher, John	. .	East Hanney, Abingdon, Berks.
Fisher, Rev. R. W.	. .	Hill Top, Kendal, Westmoreland
Fisher, Thomas Richard . .	. .	Oxford
Fisher, William	. .	Copyhold, Newbury, Berkshire
Fletcher, Sir Henry, Bart. .	. .	Ashley Park, Walton-on-Thames, Surr.
Flesher, Rev. J. T.	. .	Tiffield, Towcester, Northampton.
Flight, Thomas	. .	Laycock's Dairy, Islington, Middlesex
Floyd, Thomas	. .	Frilford, Abingdon, Berks.
Floyer, J. G.	. .	Ketsbyn, Louth, Lincolnshire
†Floyer, John	. .	Stafford, Dorchester, Dorset.
Foll, William	. .	Chalgrave, Dunstable, Beds.
Footner, W. A.	. .	Romsey, Hampshire

Members.	Town Residence.	Country Residence.
Fordham, John George	. .	Odsey House, near Royston, Herts.
Fordham, John Edward	. .	Melbourn Bury, Royston, Cambridgesh.
Foreman, Thomas	. .	Acton-Burnell, Much-Wenlock, Salop.
Foreshew, William	. .	Meysey-Hampton, Fairford, Gloucester
Formby, Rev. James	. .	Frindsbury, Rochester, Kent
Forster, John	18 Carey st, Ln-inn	Newton-le-Willows, Bedale, Yorks.
Forster, Robert	. .	Tottenham, Middlesex
Fort, George	. .	Alderbury House, Salisbury, Wilts.
Foster, J. W.	. .	Clapham, near Settle, Yorkshire
Foster, Ebenezer	. .	Anstey Hall, Cambridge
Foster, Richard, Jun.	. .	Cambridge
Foster, Joseph	. .	Witham, Essex
Fothergill, Richard	. .	Bridge House, Kendal, Westmoreland
Fowlis, Rev. Henry	. .	Little Brickhill, Fenny-Stratford, Bucks.
Fowke, William	. .	Rudgeley, Staffordshire
Fowler, Henry	. .	Kingham, Chipping-Norton, Oxon.
Fowler Thomas	Prince's-st, Bank	Tottenham, Middlesex
Fowler, William M.	25, Bentk-st, Cav-sq	Sunning Hill, Windsor, Berkshire
Fowlie, William	. .	Red House, Hursley, Winchester, Hants
Fox, Rev. Dr.	. .	Queen's College, Oxford
Fox, Francis	. .	Tottenham, Middlesex
Ffrance, T. R. Wilson	. .	Rawcliffe Hall, near Preston, Lancashire
†Franklin, Richard	. .	Clementstone, Bridgend, Glamorganshi.
Franklin, Edward L.	. .	Ascott, near Benson, Wallingford, Oxon.
Franklin, John	. .	Ewelme, near Benson, Wallingford, Oxon
Fraser, Alexander	. .	Flamstead Bury, Redbourn, Herts.
Frazer, Alexander	. .	Middle-Claydon, Winslow, Bucks.
Freeman, John	. .	Rudham, Rrougham, Norfolk
Freeman, Thomas	. .	Henham, Wangford, Suffolk
Freere, Rev. E.	. .	Finningham, Eye, Suffolk
Fremantle, Rt Hon Sir W, GCH	. .	Englefield Green, Chertsey, Surrey
Frost, W. F.	. .	Thorrington, Colchester, Essex
Fryer, William, R.	. .	Lytchott, Wareham, Dorset.
Fuge, Robert	. .	7, Drury Square, Clifton, Bristol
Fullagar, James	. .	Milton, Sittingbourne, Kent
Fullard, Thomas	. .	Thorney, Peterborough, Northamptons.
Fullerton, Colonel John	. .	Thrybergh Hall, near Rotherham, York.
Fuller, Hugh	. .	Portslade, Brighton, Sussex
Fulljames, Thomas	. .	Hasfield Court, near Gloucester
Fulljames, Thomas, jun.	. .	Hasfield Court, near Gloucester
Fulshaw, Richard	. .	Knighton, near Leicester
Gabb, Baker	. .	Abergavenny, Monmouthshire
Gabell, Charles	. .	Holyfield, nr Crickhowel, Brecknocksh.
Gage Hon. W.	. .	Westbury House, Bp's Waltham, Hants.
Gamble, John	. .	Manor Farm, Shouldham Thorpe, Norf.
Gape, Thomas Foreman	. .	St. Alban's, Hertfordshire
Gardner, Austen	. .	Beaksbourn, near Canterbury, Kent
Gardner, Rev. Christopher	. .	East Dean, near Southampton, Hants.
Gardner, James	. .	Adderbury, Banbury, Oxfordshire
Gardner, James	. .	Banbury, Oxfordshire
Gardom, Thomas	. .	The Yell, Baslow, Bakewell, Derbyshire
Garne, William	. .	Aldsworth, Northleach, Gloucestershire
Garnett, Christopher	. .	Low Sizergh, Kendal, Westmoreland
Garrard, Charles Drake	. .	Lamer Hall, Hatfield, Herts.
Garrett, Richard, jun.	. .	Leiston, Saxmundham, Suffolk
Gater, Caleb H.	. .	Swansling, near Southampton, Hants.
Gater, Edward	. .	Townhill, near Southampton, Hants.
Gater, W. B.	. .	West End, near Southampton, Hants.

Members.	Town Residence.	Country Residence.
Gates, George	. .	Steyning, Sussex
Gates, Richard	. .	Marshall Vale, Bramby, Guildford, Sur.
Gedney, John	. .	Redenhall, Harleston, Norfolk
Gee, Thomas	. .	Barton, Lincolnshire
Gibbon, Alexander . . .	. .	Staunton, near Newnham, Glouces.
Gibbs, George	26, Down-st., Pic.	
Gibbs, Joseph	. .	Elsfield, near Oxford
Gibbs, Thomas	. .	Ampthill, Bedfordshire
Gibbs, William	. .	Alveston Hill, Stratford-on-Avon, War.
Gibbs, William	. .	Itchenor, Chichester, Sussex
Giblett, John	8, West Smithfield	
Gibson George John . . .	. .	Sandgate Lodge, Storrington, Petwth Sus
Giddy, C., Com. R.N. . . .	. .	Penzance, Cornwall
Gilbertson, Matthias . . .	. .	Elm Cottage, Egham, Surrey
Gilbert, Rev. A. T. . . .	. .	Hippenscombe, Wiltshire
Gilbert, George	. .	Colchester, Essex
Gilbert, William	. .	Oxford University
Gillett, Joseph	. .	Little Haseley, Tetsworth, Oxfordshire
Gillett, Joseph Ashby . . .	. .	Banbury, Oxfordshire
Gillett, William	. .	Southleigh, Witney, Oxfordshire
Gilliat, Aitkin	. .	Scrofield, Horncastle, Lincolnshire
Gills, W.	. .	Alveston Heath, Stratford-on-Avon, War.
Gladwin, Thomas	. .	Marden Park, Godstone, Surrey
Glaister, Henry R. . . .	. .	Bedale, Yorkshire
Glaister, Rev. William . .	. .	University College, Oxford
Glover, John	. .	Bangley, Tamworth, Staffs.
Goard, Richard	. .	Hartlip, Sittingbourne, Kent
Goddard, Horatio N. . . .	. .	Cliff, Wootton Bassett, Wiltshire
Goddard, Edward	. .	Crookham, Newbury, Berkshire
Goddard, Philip		
Goddard, Rev. Richard . .	. .	Broadstone, Church Euston, Oxon.
†Godfrey, Edward	. .	OldHall, East-Bergholt, Hadleigh, Suff'k
Godfrey, George	. .	Childrey, Wantage, Berkshire
Godfrey, Thomas	. .	Chawley, near Oxford
Godwin, John	. .	Durweston, Blandford Forum, Dorset.
Godwin, Richard	. .	Durweston, Blandford Forum, Dorset.
Goldhawk, Rowland, Jun. .	. .	Hazle Hall, Sheer, Guildford, Surrey
Gonne, Thomas George . .	. .	Great Vaynor, Narbeth, Pembrokeshire
Good, George	. .	Gussage, Blandford, Dorset.
†Goodden, John	. .	Compton House, Sherborne, Dorset.
Goodenough, Joseph . . .	. .	Nether-Cerne, Dorchester, Dorset.
Goodhall, Michael	. .	Evelith Manor, Shiffnal, Salop
Goodlake, T. Mills	. .	Wadley House, Faringdon, Berks.
Goodlake, Thomas	. .	Benhams, Wantage, Berks.
Goodricke, SirFrancis L.H., Bt.	. .	Studley Castle, Alcester, Warwickshire
Gore, Ormsby, M.P.	66, Portland-place	
†Goring, Harry Dent, M.P. .	Windham Club .	Highden, Shoreham, Sussex.
Goring, Mrs.	. .	Wiston Park, Steyning, Sussex
Goring, Charles	. .	Wiston Park, Steyning, Sussex
Gorring, J. P.	. .	Eastbourne, Sussex
Gorring, Mrs. J. P.	. .	Eastbourne, Sussex
Gosford, William	. .	Everingham, Pocklington, Yorkshire
Gosling, Benjamin.	19, Fleet-street .	Roehampton Grove, Surrey
Gough, Frederick	. .	St. Alban's, Hertfordshire
Gould, John	. .	Poltimore, Exeter, Devonshire
Gower, G.	. .	Dilham, North Walsham, Norfolk
†Gower, W. Leveson, Jun. .	33, Low. Brook-st.	Titsey Place, Godstone, Surrey
Gowing, Edward	. .	Eye, Suffolk
Graburn, R. S.	. .	Branswell Cottage, Sleaford, Lincolns.
Graburn, William	. .	Barton-on-Humber, Lincolnshire

Members.	Town Residence.	Country Residence.
Grace, James	. .	Wordrobes, Risborough, Bucks.
Grace, Rev. H. T.	. .	Jovington, Eastbourne, Sussex
Graham, Captain, R.N.	. .	Netherby Hall, Longtown, Cumberland
Graham, Rev. H. G.		
Grain, Rev. Charles	. .	Linton, Cambridgeshire
Grain, P.	. .	Shelford, Cambridgeshire
Granger, Thomas	. .	Stretham, Cambridgeshire
Grant, J. C.	. .	Stamford, Lincolnshire
Grant, William, Jun.	1, Plowden-bs., Tem.	Litchborough, Towcester, Northampton
Grantham, Stephen	. .	Stoneham, Lewes, Sussex
Grantham, Rev. Thomas	. .	Bramber, Steyning, Sussex
†Gratwick, W. G. K.	. .	Ham, Arundel, Sussex
Greaves, Robert	. .	Bloxholm, Sleaford, Lincolnshire
Greaves, Edward	. .	Barford, near Warwick
Greaves, William	. .	Bakewell, Derbyshire
Green, Richard	. .	Great Gonnerby, Grantham, Lincolns.
Green, —		
Green, Rev. G. W.	. .	Court-Henry, Llandeilo, Narbeth, Pem.
Green, William.	5, Up. Seymour-st.	
Greene, W. Burnaby	. .	Wickham, Bishop's Waltham, Hants.
Greenaway, Charles, M.P.	. .	Barrington Grove, Burford, Oxfordshire
Greenwood, Charles	. .	Wallingford, Berkshire
†Gregg, Thomas	. .	Coles Park, Hertfordshire
Gregory, Arthur F.	. .	Styvichal Hall, Coventry, Warwicks.
Gregory, William	. .	Cirencester, Gloucestershire
Gregory, Thomas	. .	Cutslow, Oxfordshire
Gresley, Rev. W.	. .	St. Charles, Lichfield, Staffordshire
Grey, Sir Chas. Edw., Bt., M.P.	. .	The Oaks, Carshalton, Surrey
Grey, John	. .	Dilston, Newcastle, Northumberland
Grey, W. H. C.	10, Cmb.-pl., N. Rd.	Clifton, near Bristol, Gloucestershire
Griffin, John	. .	Hemel-Hemstead, Hertfordshire
Griffith, C. Darby	. .	Padworth House, Reading, Berkshire
Griffith, Mrs. Darby	. .	Padworth House, Reading, Berkshire
Griffith, Samuel Y.	. .	Oxford
Grimshaw, W.	. .	Hackney, Middlesex
Groome, Charles	. .	Sompting, Shoreham, Sussex
Grove, L.	. .	Shenstone Park, Lichfield, Staffords.
†Grove, Thomas	. .	Fern, Shaftesbury, Dorsetshire
Guerrier, William	8, West Smithfield	
Guillemard, John L., F.R.S.	27, Gower-street	Clavering, Stansted-Montfitchet, Essex
Gunner, William	. .	Well Hall, Alton, Hampshire
Gurdon, Rev. Philip	. .	Cranworth, Shipdam, E. Dereham, Nflk.
Gurdon, William	10, Crown O. Temp.	
Guy, George	. .	Turl, Oxfordshire
Gwilt, Rev. Daniel	. .	Icklingham Rectory, Mildenhall, Suffk.
Gwynne, Captain A. L.	. .	Monachty, Cardiganshire
Hack, James	. .	Bowley, Chichester, Sussex
Haines, Edward	. .	Stratton, Cirencester, Gloucestershire
Halcomb, William	. .	Poulton, Marlborough, Wiltshire
Halcomb, W. H.	. .	Hungerford, Berkshire
Hale, Edward	. .	Hambledon, Horndean, Sussex
Hale, Thomas	. .	East Hanney, Abingdon, Berks.
Halke, Rev. J	. .	Weston-by-Welland, Northamptonshire
Halton, John		
†Hall, John	. .	Wiseton, near Bawtry, Nottinghamsh.
Hall, John	. .	Bretforton, Evesham, Worcestershire
Hall, George Webb	. .	Sneed Park, Bristol
Hall, Henry	. .	Holbrook, Wincanton, Somersetshire

Members.	Town Residence.	Country Residence.
Hall, James		Scorborough, Beverley, Yorkshire
Hall, Richard		Cirencester, Gloucestershire
Halsted, Thomas		Woodcote, near Chichester, Sussex
†Hamilton, Captain Archibald		Rozelle, near Ayr, N.B.
Hammans, C.		Garford, Abingdon, Berkshire
Hammersley, Hugh	69, Pall Mall	Great Haseley, Tetsworth, Oxfordshire
Hammond, Thomas		Ashley, Newmarket, Cambridgeshire
Hamond, Wm. P.	123, Mount street	
Hanbury, John		Carborough, Lichfield, Staffordshire
Hanbury, Osgood		Coggeshall, Essex
Hancock, Abraham		Hall Place, Rockley, Alton, Hants.
Handley, Major		Pointon, Folkingham, Lincolnshire
Hanmer, Lieutenant-Colonel		Bear Place, Maidenhead, Berks.
Hannam, George		Alland Grange, Isle of Thanet, Kent
Hannam, Henry S.		Burcott, Bensington, Oxfordshire
Hannen, Henry, Jun.		
Hanson, John	37, Seymour-place	
Harcourt, Capt. Octavius, R.N.		Swinton Park, Bedale, Yorkshire
Harcourt, W. B.		St. Leonard's, Windsor, Berks.
Harding, Joseph		Maiden-Bradley, Mere, Wiltshire
Hardman, Edward		Royal Dublin Society, Dublin
Hardy, J.		Tendring Hall, Colchester, Essex
Hare, Joseph		Wilton Farm, Beaconsfield, Bucks
†Hare, John		Springfield, Bristol
Harford, John Scandret, F.R.S.		Blaize Castle, near Bristol
Harford, W.		Barly Wood, Bristol
Harris, George Hemington		Cambridge
Harris, John		Hinton, Abingdon, Berkshire
Harris, Richard		Wootton Grange, Northamptonshire
Harris, William		Weston, Leamington, Warwickshire
†Harrison, Richard		Wolverton, Stony-Stratford, Bucks.
Harrison, Daniel		Kendal, Westmoreland
Harrison, Rev. J.		Dinton, Aylesbury, Buckinghamshire
Harrison, John		The Bank, Bakewell, Derbyshire
Harrison, John		Home Farm, Stow Bardolph, Norfolk
Harrold, O. W.		Donnington Court, Ledbury, Herefordsh.
Hart, H. P.		Beddingham, Sussex
Harvey, Robert Blyth		Harleston, Norfolk
Harvey, Robert H.		Sturminster, Newton, Dorsetshire
Harwood, Thomas		Winterfold, Kidderminster, Worcestersh
Hartley, W. H. H.		Bucklebury House, near Newbury, Berks.
Haselfort, R. L.		Boreham, Chelmsford, Essex
Hasler, Richard		Aldingbourne, Chichester, Sussex
Hastings, John		Longham, East Dereham, Norfolk
Hastings, Matthew		Ensham, Witney, Oxfordshire
Hawkesley, Rev. J. W.		Redruth, Cornwall
†Hawkins, Thomas		Assington, Neyland, Suffolk
Hawkins, William		Hitchin, Hertfordshire
Hawkins, William		Colchester, Essex
Hawkins, J. H.		Dorchester, Dorset.
Hawkins, John		Hitchin, Hertfordshire
Hawtrey, John		
Haynes, William		Handborough, Woodstock, Oxfordshire
Hayward, William		Hintlesham, Hadleigh, Suffolk
Hayward, Drinkwater S.		Frocester Court, Stroud, Gloucestershire
Hayward, J. Curtis		Quedgeley, near Gloucester
Hayward, Henry		Watlington, Henley-on-Thames, Oxf.
Hayward, Robert		Colchester, Essex
Hayward, William		Manor House, Weston Turville, Bucks
Headley, Henry		Cambridge

Members.	Town Residence.	Country Residence.
Heald, Dr.	. .	Spalding, Lincolnshire
Hearn, Stephen	. .	Broom, Alcester, Warwickshire
Heath, Sergeant	. .	Kitlands, Dorking, Surrey
Heighton, Edward		
Heiver, John		
Heming, Henry	. .	Brampton, Northamptonshire
Heneage, Geo. H. Walk., M.P.	. .	Compton Bassett, Calne, Wilts.
Henning, James	. .	Wolverton, Dorchester, Dorset.
Hercy, John	. .	Hawthorn Hill, Bracknell, Berks.
Herrick, William	. .	Bear Manor Park, Loughboro', Leicest.
Herver, Joseph		
Hervey, Lionel	. .	Winkfield, Bracknell, Berkshire
Heseltine, William . . .	. .	Worlaby House, Barton, Yorkshire
Hester, George P.	. .	Oxford
Hewer, Jasper	. .	Minchinhampton, Gloucestershire
Hewer, John	. .	Hampton Lodge, near Hereford
Hewer, Joseph	. .	Eastington, Northleach, Gloucest.
Hewer, William	. .	Northleach, Gloucestershire
Hewitt, Lieut. R.N. . . .	. .	Eastbourne, Sussex
Heygate, Robert	. .	West Haddon, Daventry, Northampton
†Heywood, Sir Benjamin, Bt. .	. .	Acresfield, Pendleton, Manchester
Hicks, Leonard	5, Gray's-Inn-sq.	
Hicks, Benjamin	. .	Hanley, Newcastle-under-Lyne, Staff.
Hickson, Richard	. .	Hougham, Grantham, Lincolnshire
Higgins, William	. .	Hambledon, Horndean, Hants.
Higgins, W. B.	. .	Picts' Hill, Bedfordshire
Hill, Rev. C.	. .	Buxhall, Stowmarket, Suffolk
Hill, Charles	. .	Wellingborough, Northamptonshire
Hill, Henry	. .	Sledmere, Malton, Yorkshire
Hillyard, Clark	. .	Thorpelands, near Northampton
Hincks, T. C.	. .	Breckenborough, Thirsk, Yorkshire
Hind, James	. .	Morebairns, Lutterworth, Leicestershire
Hind, William	. .	Groby, Leicestershire
Hinton, William	. .	Daglingworth, Cirencester, Gloucesters.
Hinxman, Edward, Jun. . .	. .	Little Durnford, Salisbury, Wilts.
Hitchcock, Henry	. .	Bodicot House, Banbury, Oxfordshire
Hitchman, S.	. .	Chipping-Norton, Oxfordshire
Hitchings, George	. .	Oxford
Hoare, Captain	. .	Wavendon, Fenny-Stratford, Bucks.
Hoare, Hugh Richard . .	100, Eaton-square	Lillingstone, Towcester, Northamp.
Hobbs, Henry	. .	Bocking, Braintree, Essex
Hobbs, William	. .	Bocking, Braintree, Essex
Hobbs, William	. .	Hythe, Kent
Hobbs, William Fisher . .	. .	Mark's Hall, Coggeshall, Essex
Hobgen, Charles	. .	Sidlesham, Chichester, Sussex
Hobgen, Joseph	. .	Sidlesham, Chichester, Sussex
Hoblyn, William Paget . .	. .	Marlhouse, Elmstead, Bromley, Kent
Hodgkinson, Richard . . .	. .	Morton Grange, Retford, Notts.
Hodson, W.	. .	Ilford, Essex
Hodson —	. .	Falmer Court Farm, Lewes, Sussex
Holbeach, William . . .	. .	Farnborough, Kineton, Warwickshire
Holcombe, Rev. G. F. . . .	. .	Brinkley, Newmarket, Cambridgeshire
†Hollist, Hasler	. .	Lodsworth, Midhurst, Sussex
Holmes, William Sandcroft .	. .	Redenhall, Harleston, Norfolk
Holton, Rev. L. M. . . .	. .	Woolhampton, Newbury, Berkshire
Hony, Rev. P. F.	Athenæum Club	
Honywood, Rev. P. J. . . .	. .	Mark's Hall, Coggeshall, Essex
Hooton, John Head . . .	. .	Kempston, near Bedford
Hopcraft, Alfred	. .	Halse, Brackley, Northamptonshire
Hopkins, John	. .	Tidmarsh House, Reading, Berks.

Members.	Town Residence.	Country Residence.
Hopper, Richard	. .	Papplewick, near Nottingham
Horlock, J. W.	. .	The Rooks, Marshfield, Tetbury, Glouc.
Hornby, Hugh	. .	Ribby Hall, Kirkham, Lancashire
Hornsby, Richard	. .	Grantham, Lincolnshire
Horwood, John	. .	Stean Park, Brackley, Northamptonsh.
Hoskins, Kedgwin, M.P. . .	90, Sloane street .	Birch House, Ross, Herefordshire
Hoskins, Sir Hungerford, Bt.	. .	Harewood, Ross, Herefordshire
Hoskyns, Chandos Wren . .	10, Chester-square	Wroxhall Abbey, Warwickshire
Houblon, Richard Archer .	. .	Cooper's-dale, Epping, Essex
Houghton, John	. .	Broom Hill, Sunninghill, Windsor, Brks.
Houldsworth, Thomas, M.P. .	16, Suffolk-street	Portland Place, Manchester, Lanc.
House, John	. .	Anderson, Blandford Forum, Dorset.
House, John, jun.	. .	Quarlstone, Blandford Forum, Dorset.
Howard, Charles	. .	14, Monkgate, York
Howard, George	. .	Hemel Hempstead, Herts.
Howard, Hon. Henry . .	. .	Charlton, Malmesbury, Wilts.
Howard, H.	. .	Greystock, Penrith, Cumberland
Howard, Joseph	. .	Aylesbury, Bucks.
Howard, T. A..	. .	Yattendon, near Newbury, Berks.
Howard, —	. .	Aylesbury, Bucks.
Howard, Col. Sir R., Bt., M.P.	Belgrave-square .	Bushy Park, Bray, Wicklow
Huckvale, Thomas . . .	. .	Over-Norton, Chipping-Norton, Oxon.
Hudson, John	. .	Castleacre, Swaffham, Norfolk
Hull, Richard	. .	Sutton-Benger, Chippenham, Wilts.
Humfrey, J.	. .	Upton, Abingdon, Berks.
Humfrey, John	. .	Upton, Abingdon, Berks.
Humfrey, William . . .	. .	Boxford, Newbury, Berks.
Hunt, James	. .	Oxford
Hunt, Zachary D.	. .	Aylesbury, Bucks.
Hurrell, Reymes	. .	Brandon Hall, Suffolk
Husband, T., jun.	. .	Stoke, Devonport, Devon.
Hutley, William	. .	Witham, Essex
Hutt, John	. .	Water Eaton, near Oxford.
Hutt, William	. .	Thrupp, Woodstock, Oxon.
Hutton, John	. .	Sowber Hill, Northallerton, Yorkshire
Hutton, William	. .	Gate Barton, Gainsbro', Lincolnshire
Ide, John	. .	West Wittering, Chichester, Sussex
Ifill, Dr.	9, Welbeck-street	
Ilott, James A.	. .	Bryanston, Blandford Forum, Dorset.
Inge, Captain		
Ingram, Hugh	. .	Steyning, Sussex
Ingram, Rev. James, D.D. .	. .	Trinity College, Oxford
Inskip, Thomas	. .	Marston, Ampthill, Bedfordshire
Irving, John, M.P. . . .	. .	Halliford, Chertsey, Surrey
Isaacson, John	. .	Clare, Suffolk
Iveson, John	1, Richmond-terr.	Ashford, Staines, Middlesex
Izard, William	. .	Grafton-in-Beckford, Gloucestershire
Jackman, James	. .	Crendon, Thame, Oxfordshire
Jackson, Hugh	. .	Wisbeach, Isle of Ely, Cambridgeshire
Jaques, R. M.	. .	St. Trinian's, Richmond, Yorkshire
Jarratt, William	. .	Lletai, Bridgend, Glamorganshire
†Jarrett, John	. .	Camerton House, Bath, Somerset.
Jeffrys, R.	. .	Structshill, Bridgewater, Somerset.
Jellicoe, John	. .	Beighterton, near Shiffnal, Salop.
Jemmett, Henry	. .	Burford, Oxfordshire
Jenkins, John	. .	St. Y-Nill, Cardiff, Glamorganshire
Jenner, Henry	. .	Chisenbury, Pewsey, Wiltshire
Jennings, R. F.	. .	Belsham Green, Sandwich, Kent

Members.	Town Residence.	Country Residence.
Jersey, Earl of,	38, Berkeley-squa.	Middleton Park, Bicester, Oxfordshire
Jervis, Sir Raymond		Fair Oak Park, Winchester, Hants.
Jobson, Robert		Turrelaws, Wooler, Northumberland
Jobson, William		Newtown, Wooler, Northumberland
Jodrell, Sir Rd. Paul, Bt. FRS.	64, Portland-place	Sall Park, Reepham, Norfolk
Johnson, Rev. A.		Hampton House, Devon.
Johnson, Rev. Dr.		Perran, Cornwall
Johnson, Cuthbert William	14, Gray's-inn-sqre	Wallingtons, Newbury, Berks.
Johnson, George	53, Tavistock-squ.	
Johnson, Theophilus Fairfax		Spalding, Lincolnshire
Johnston, Rt. Hon. Sir Al. Bt.	19, Gt. Cumbrl.-pl.	York House, Twickenham, Middlesex
Johnston, Sir F., Bart.		Melton Mowbray, Leicestershire
Johnstone, John Hutton		Menston, near Ledbury, Herefordshire
Jonas, Samuel		Ickleton, Saffron Walden, Essex
Jones, Edward		Shiffnal, Salop.
Jones, Philip, Jun.		Sugwas Court, near Hereford
Jones, John		Harrington, Spilsby, Lincolnshire
Jones, Whitmore		Chassleton, Chipping Norton, Oxo .
Jones, William		Sheep House, near Gloucester
Jordan, Rev. G. W.		Waterstock, Thame, Oxfordshire
Jowett, Rev. J. F.		Kingston, Bagpuze, Abingdon, Berks.
Juckes, Thomas		Fearn, Salop.
Kedward, James D.		
†Kemble, Horatio		Leggatt's, near Hatfield, Hertfordshire
†Kemble, Thomas	125, Piccadilly	Leggatt's, near Hatfield, Hertfordshire
Kendall, Samuel		H. M. Norf. Farm, Sunninghill, Chertsey
Kendle, C. J.		Fordham, Downham Market, Norfolk
Kendle, James		Weasenham, Fakenham, Norfolk
Kennaway, Sir John, Bart.		Escot, Honiton, Devonshire
Kensey, George		Cornbury Park Farm, Witney, Oxon.
Keppel, Hon. and Rev. Thos.		Warham, Wells, Norfolk
Kersey, James		Talton, Cirencester, Gloucestershire
Kersey, Robert		Cross, Hadleigh, Suffolk
Kett, George Samuel		Brooke House, Norwich, Norfolk
Kilby, George		Queeniborough, Leicestershire
Kilson, Rev. H.		Folkington, Hailsham, Sussex
Kimberley, George		Trotsworth, Egham, Surrey
Kimber, Thomas		Fyfield Wick, Abingdon, Berks.
Kimber, Thomas		Bourton-on-the-Water, Stow, Glo'ster
Kimber, Thomas		North Cerney, Cirencester, Gloucester.
†Kinder, John		Sandridge Bury, St. Alban's, Herts.
Kinder, Thomas		Sandridge Bury, St. Alban's, Herts.
King, Bolton		Umberslade, Warwickshire
†King, Charles		Little Brinton, Northamptonshire
King, F.		Oxford
King, Fielder		Buriton, Petersfield, Hants.
King, J. Bennett		Wotton, Abingdon, Berkshire
King, John		Loxwood House, Petworth, Sussex
King, Joseph		Whitehall, Stourbridge, Worc.
King, Rev. James		Henley-on-Thames, Oxfordshire
King, Robert		Wytham, near Oxford
King, W. F.		Stourton, Mere, Wiltshire
†Kingscote, Thomas		Kingscote, Tetbury, Gloucestershire
†Kingsmill, William		Sydmonton Park, Newbury, Berks.
Kinsman, Rev. R. B.		
Kintore, Earl of		Keith Hall, Aberdeen
Kirby, John		South Moreton, Wallingford, Berks.
Knapp, H.		
†Knatchbull, William		Babington, Frome, Somersetshire

Members.	Town Residence.	Country Residence.
†Knight, Henry Gally, M.P.	69, Grosvenor-st.	Firbeck Hall, Bawtry, Yorkshire
Knight, Edward	. .	Godmersham Park, Canterbury, Kent
Knight, E. Jun.	. .	Chawton House, Alton, Hants.
Lacey, James Murray	20,Carey-st.Ln.I.F.	
La Coste, Thomas B.	. .	Abbey Mills, Chertsey, Surrey
Lakin, Henry	. .	Severn End, Upton, Worcestershire
Lamb, William	. .	Hay Carr, Ellel, Lancaster
Lance, Edward Jarman	95, Albany-street	Barrossa Cottage, Bagshot, Surrey
Lane, John	5, Inner Temp.-lan.	
Langdale, Hon. Charles, M.P.	31, Jermyn-street	Houghton Hall, Market-Weighton, York
Langford, T. C.	. .	Udinore, Rye, Sussex
Large, Charles	. .	Broadwell, Burford, Oxfordshire
Large, William	. .	Upper Lambourn, Berkshire
Latham, R. Cousins	. .	Clifton, Dorchester, Oxfordshire
†Law, Rev. R. V.	3,Up.Geo.-st.M.sq.	Christian-Malford, Chippenham, Wilts.
Lawford, Edward	. .	Leighton-Buzzard, Bedfordshire
Lawford, John	. .	Mount Pleasant, Tottenham, Middlesex
Lawford, W. R.	. .	Leighton-Buzzard, Bedfordshire
Lawrance, William	. .	Peterborough, Northamptonshire
Lawrence, Capt. J. R.	. .	East Harptree, Wells, Somersetshire
Lawrence, James	. .	Astree, Berkshire
Lawrence, R.	. .	Betterton, Wantage, Berkshire
Lawson, Andrew	. .	Aldborough Lodge, Boroughbridge, York
Lawson, Robert	11, Keppel-st.R.sq.	
Lawson, W. C.	. .	Edinburgh
Layburn, Daniel	. .	Eske, Beverley, Yorkshire
Layburn, Jonathan	. .	Wold Cottage, Bridlington, Yorkshire
Laxton, R. W.	. .	Morborn, Stilton, Huntingdonshire
Leach, George	. .	Stoke, Devonport, Devonshire
Le Couteur, Colonel John	. .	Belle-Vue, Jersey
Lediard, Thomas	. .	Cirencester, Gloucestershire
†Lee, Lee J.	. .	Delington House, Ilminster, Somerset.
Lees, Charles	. .	Eastling, Faversham, Kent
Lees, George Wyld	47, Fleet-street	
Lefevre, John G. Shaw, F.R.S.	5, Hyde Park-gard.	
Lefroy C. E.	. .	Emshot House, Farnham, Surrey
Leifchild, John	Moorgate-st., Fins.	
Lemmon, Charles	. .	Coltshall Farm, Shouldham, Norfolk
Lescher, Joseph	. .	Boyles, Brentwood, Essex
Lethbridge, Sir Thos. B., Bart.	6, Upp. Blgrave-st.	Sandhill Park, Taunton, Somerset.
Lewis, John	. .	Llanthetty Hall, near Brecon, S. W.
Lewis, Edward	. .	Bayford Bury, near Hertford
Lewis, Robert	. .	Stompain, Blandford, Dorset
Ley, Rev. Jacob	. .	Oxford
Ley, Jacob	. .	Christ Church, Oxford
Lidbetter, Richard	. .	Bramber, Steyning, Sussex
Liddon, John William	. .	Hemel Hempstead, Hertfordshire
Liefchild, W. G.	. .	Enfield, Middlesex
Lilford, Lord	10, Grosvenor-pl.	Lilford Hall, Oundle, Northamptonshire
Lincoln, Earl of	25, Park-lane . .	Ranby Hall, Retford, Nottinghamshire
Lindsell, R	. .	Biggleswade, Bedfordshire
Lines, W.	. .	Haddenham, Thame, Oxfordshire
Linnell, Richard		
†Linton, Rev. James	. .	Hemingford, St. Ives, Huntingdonshire
Lipscomb, John	. .	Petersfield, Hampshire
Lismore, Viscount	11,Up.Belgrave-st.	Shanbally Castle, Clogheen, Ireland
Little, William Hunter	. .	Lanvair Grange, Abergavenny, Monm.

Members.	Town Residence.	Country Residence.
Littlewood, John	. .	Armthorpe, Doncaster, Yorkshire
Livesay, Thomas	. .	Hackney, Middlesex
Lloyd, Cynnic	. .	Pontryfyth, Denbigh, North Wales
Lloyd, L. F. Lloyd	. .	Pontryfyth, Denbigh, North Wales
Lloyd, Llewellyn	. .	Pontryfyth, Denbigh, North Wales
Lloyd, Rev. T.	. .	Swayfield, North Walsham, Norfolk
Lloyd, Rev. Thomas J.	. .	North Wraxall, Chippenham, Wilts
Lloyd, W.	. .	Aston, Oswestry, Salop.
Lock, George	. .	Oxford
Lock, George	. .	Blandford, Dorsetshire
Loft, William	. .	Trusthorpe, Alford, Lincolnshire
Long, Walter	29, Mill-street	Preshaw House, Alton, Hampshire
Long, Walter J.	. .	Preshaw House, Alton, Hampshire
Longstaff, Charles		
Lord, C.	. .	Bridge Norton, Witney, Oxon.
Lord, Richard	. .	Hambleden, Henley-on-Thames, Oxon.
Lousley, Job	. .	Hampstead-Norris, East Ilsley, Berks.
Lovesey, C. W.	. .	Charlton Kings, Cheltenham, Glouc.
Lowe, Charles	. .	Stamford, Lincolnshire
Lowndes, William	. .	Brightwell, Tetsworth, Oxon.
Lucan, Earl of	Spntine-ter, Knisbg	Laleham, Staines, Middlesex
Lucas, Joseph	. .	Rowsham, Aylesbury, Bucks.
Lugor, Elwood	. .	Hengrave, Bury St. Edmund's, Suffolk
Lumbert, R. C.	. .	Burghleigh Hill, Reading, Berks.
Lunn, Robert, jun.	. .	Norton, Evesham, Worcestershire
Lush, Joseph	. .	Kilmington, Bruton, Somersetshire
Lyne, William	. .	Kingham, Chipping-Norton, Oxon.
†Lyon, James Wittit	39, Belgrave-sq.	Miserdine Park, near Cirencester, Glouc.
Mabbott, William Courthop	. .	Lewes, Sussex
Macbride, David, D.C.L.	. .	Oxford
Macdonald, Alexander	3, St. Mildred's-ct.	
†Mackenzie, Sir Francis A., Bt.	60, Lombard-street	Cowan House, Dingwall, Ross-shire, NB.
Maclaine, Colonel		
Macnamara, A.	. .	Langoed Castle, Brecknock
Macneill, Forbes	. .	Grove Lodge, Hayes, Middlesex
Maitland, F. C.		
†Mainwaring, Townshend	Mincing-lane	Marchiviel Hall, Wrexham, Denbigh
Malins, Daniel	. .	Brackley, Northamptonshire
Mallam, Thomas	. .	Oxford
Maltby, Edward Harvey	11, Pap-bds. Temple	
Manby, Capt. Geo. W., F.R.S.	. .	Yarmouth, Norfolk
Manning, John	. .	Harpole, near Northampton
†March, Earl of	51, Portland-place	Goodwood Park, Chichester, Sussex
Marden, William	. .	Rainham, Essex
Margetts, William	. .	Woodstock, Oxfordshire
Marmont, James	. .	Bristol
Marriott, Rev. George	. .	Kemberton Rectory, Shiffnal, Salop
Marsh, John	32, Bucklersbury	
Marshall, Captain Henry	4, Upp. Eaton-st.	
Marshall, John	. .	Eden Lodge, Beckenham, Kent
Marshall, Thomas Gould	. .	Harvington Lodge, Evesham, Worces.
Marshall, William, M.P.	41, Upp. Grov.-st.	Patterdale Hall, Carlisle, Cumberland
Marshall, William	. .	Hurst, Brighton, Sussex
Marsham, Charles W.	. .	Stratton Strawless Hall, Aylesham, Nk.
Marsham, R.	. .	Merton College, Oxford
Marsham, Robert	61, Up. Seymour-st	Stratton Strawless Hall, Aylesham, Nfk.
Martin, Edward Wenman	33, Eaton-place	Brickwood House, Croydon, Surrey
Martin, Henry Burgess	. .	Colston Hall, Bingham, Nottinghams.

Members.	Town Residence.	Country Residence.
Martin, Robert		Asterby, Horncastle, Lincolnshire
Martin, Thomas		Ashton Underhill, Gloucestershire
†Mason, C. A.		Farrinton, Ledbury, Hereford
Mason, John		Wornsditch Farm, Kimbolton, Hunts.
Massingberd, Rev. Algernon		Gunby Park, Spilsby, Lincolnshire
Massop, John		
Masters, Joseph		Witney, Oxfordshire
Masters, Robert		
Mathews, Isaac		Marlston, Newbury, Berks.
†Mathews, J.		Park Hall, Kidderminster, Worcestersh.
Maton, James		Collingbourne, Pewsey, Wilts.
Matson, Charles		Baddow Park, Chelmsford, Essex
Matson, Robert		Wingham, Kent
Matthew, John		
Matthews, John		Oxford
Matthews, Peter		Elkstone, Cirencester, Gloucestershire
Matthews, Stephen		Lidiard, Swindon, Wiltshire
Maugham, John		Jerveaux Abbey, Bedale, Yorkshire
Mauleverer, William		Arncliffe Hall, Cleveland, Yorkshire
Maw, George		Walk House Barrow, Lincolnshire
Mawclark, William		Strood, Rochester, Kent
Maxwell, William Constable		Everingham Park, Pocklington, Yorks.
May, Charles		Ipswich, Suffolk
Maydwell, Daniel		Leatherhead, Surrey
Mayhew, Joseph		Petmarsh, Essex
Mayne, John Thomas, F.R.S.	Temple	Teffont House, Salisbury, Wilts,
Mellor, James		Shiffnal, Salop
Menteath, Sir Chas. G. S., Bt.		Closeburn Hall, Dumfries, N. B.
†Metcalfe, C. J., Jun.		Roxton House, St. Neot's, Huntingdons.
Michell, Edward		Steyning, Sussex
Middleton, Captain		Leasingham, Sleaford, Linc.
Milden, T.		Brinnington Hill, Warwick
Mildmay, P. St. John, M.P.	21, Edw-st, Port-sq	Hasle Grove House, Sherborne, Dorset.
Miller, Rev. M. H.		Scarborough, Yorkshire
Miller, William		Watereaton, near Oxford
Millington, Bryan		Asgarby, Sleaford, Lincolnshire
Mills, C. S.		Newbury, Berkshire
Mills, Rev. William		Shellingford, Faringdon, Berks.
Mills, John		Ulceby Barton, Lincolnshire
†Milne, Alexander	Whitehall	
Milnes, John L.	24, Holles st. Cav-sq	Hilgay Lodge, Downham Market, Norf.
Milnes, R. Monckton, M.P.	26, Pall Mall	Fryston Hall, Pontefract, Yorkshire
Minet, Charles William		Brasted, Sevenoaks, Kent
Mitchell, James Henry		Heath Cottage, Banbury, Oxon.
Monck, J. B.		Coley Park, Reading, Berks.
Monckton, G.		Stretton, Penkridge, Staffordshire
Montefiore, J. B.	16, Geo st. Man-ho.	
Montgomerie, C. M.		Garboldisham Hall, Harling, Norfolk
Moody, C. A.		Kingsdown, Ilchester, Dorset.
Moor, Major Edward, F.R.S.		Bealings, Woodbridge, Suffolk
Moore, George		Banbury, Oxfordshire
Moore, George F.		Perth, Swan River, Australia
Moore, Rev. H.		Willingdon, Eastbourne, Sussex
Mordaunt, Rev. C.		Badgworth Cross, Axbridge, Somerset.
Morgan, George		Biddlesden Park, Brackley, Northamps
Morland, G. B.		Abingdon, Berkshire
Morrell, Frederick J.		Oxford
Morrell, James, Jun.		Headington Hill, Oxford
Morrell, Mark T.		Oxford
Morton, Henry		Denham, Buckinghamshire

Members.	Town Residence.	Country Residence.
Morton, John Chalmers . .	. .	Chester Hill, Stroud, Gloucestershire
Mount, Thomas	. .	Saltwood, Hythe, Kent
Mount, William	. .	Wasing-place, Newbury, Berkshire
Mountford, ——	. .	Barrows Farm, Lambourn, Berkshire
Mumford, George	. .	Downham-Market, Norfolk
Mules, William	. .	The Grove, Colchester, Essex
Munday, S..	. .	Abingdon, Berkshire
Mundy, H.	. .	Andover, Hampshire
Mundy, J.	. .	Culham, Abingdon, Berks.
Murray, John	Albemarle-street	
Mushett, James	. .	Lambsquay, Dean Forest, Glouc.
Muskett, John	. .	Farnham, Bury St. Edmund's, Suffolk
Myers, John Dyneley . . .	. .	Langford, Lechlade, Gloucestershire
Myers, Thomas.	. .	Langford, Lechlade, Gloucestershire
Nalder, John	. .	Northmoor, near Oxford
Nash, Charles	. .	Royston, Hertfordshire
Nash, John	. .	Reigate, Surrey
Nash, Joseph	. .	Reigate, Surrey
Nash, W.	. .	Langley, Bucks.
Neale, Stephen.	. .	Tytherington, Warminster, Wiltshire
Neale, H. St. John	. .	Ringwood, Hampshire
Neame, Charles	. .	Selling, Faversham, Kent
Neame, Frederick	. .	Selling, Faversham, Kent
Neame, John	. .	Selling, Faversham, Kent
Neame, Thomas	. .	Canterbury, Kent
Neave, Sheffield	6, Albemarle-st.	
Neeld, John, M.P.	6, Grosvenor-squr.	Red Lodge, Cricklade, Wiltshire
Neeve, ——		
Nelson, Rev. J..	. .	Childrey, Wantage, Berkshire
Neve, John.	. .	Tenterden, Kent
Neve, Thomas	. .	Benenden, Cranbrook, Kent
Newman, Charles	. .	Hayes, Southall, Middlesex
Newnham, Henry		
Newton, Marcellus	. .	Wareham, Hereford
Newton, M.	. .	Wareham, Hereford
Newton, Richard	. .	Britwell, Watlington, Oxon.
Niblett, D. J.	. .	Haresfield, Stroud, Gloucestershire
Nicholds, M.	. .	Saffron-Walden, Essex
Nicholson, William Henry .	1, Robert-st., Adel.	Upnor, Rochester, Kent
Nicholson, Brady	. .	Wootton Barrow, Lincolnshire
Nicklin, Richard	. .	Tipton, near Birmingham, Warwicksh.
Noakes, T.	. .	Warncocks, near Eastbourne, Sussex
Norreys, Lord, M.P.	40, Grosvenor-sq.	Wytham Abbey, near Oxford
Norris, W. John	. .	Radwell House, Baldock, Herts.
North, Frederick	. .	Rougham, Swaffham, Norfolk
North, Lieut.-Col.	. .	Wroxton Abbey, Oxon.
Northcote, Henry Stafford .	. .	Pyne's, Exeter, Devonshire
Northeast, Thomas	University Club	Tedworth, near Andover, Hants.
Northey, Edward S.	. .	Epsom, Surrey
Northhouse, William Spencer	2, Storey's Gate	
Nott, John		
Noyes, Finch	. .	Laverstock Hall, Salisbury, Wilts.
Noyes, Thomas H.	. .	East Mascalls, Lindfield, Sussex
Oakley, Thomas	. .	Water End Farm, Sandridge, St. Alban's
Oakley, John	. .	Larkin Hall, Frindsbury, Rochester, Kt.
O'Brien, Stafford	. .	Blatherwick Park, Stamford, Lincolns.
Ogle, Henry	. .	Eastbourne, Sussex

Members.	Town Residence.	Country Residence.
Oldham, Thomas	. .	Saltflectby, Louth, Lincolnshire
Oliver, William		
Oliver, John	. .	Abingdon, Berkshire
†Oliverson, Richard . . .	14, Portland-place	
Oliver, James	. .	Handford, Blandford Forum, Dorset.
Onley, Charles Savill, F.R.S. .	Grt. Geo.-st. West.	Stisted Hall, Braintree, Essex
Orlebar, R. Lonquet . . .	. .	Hinwick Ho., Wellingborough, Northam.
Ormond, William	. .	Wantage, Berkshire
Osbinton, Samuel	. .	East Rainham, Norfolk
Osborne, Charles	. .	Hayling, Emsworth, Hampshire
Overman, C. E.	. .	Burnham Westgate, Norfolk
Overman, T. W.	. .	Maulden, Ampthill, Bedfordshire
Overman, John	. .	Burnham Sutton, Burnham Westg. Norf.
Overman, Henry	. .	Weasenham, Fakenham, Norfolk
Owen, Thomas	. .	Kentbury, Newbury, Berks.
Packe, Colonel H. . . .	. .	Twyford Hall, Guist, Norfolk
Padwick, Frederick . . .	. .	West Thorney, Chichester, Sussex
Pagden, ——	. .	Eastbourne, Sussex
Paget, George	. .	Sutton Bonington, Kegworth, Leic.
Paget, Charles.	. .	Ruddington Grange, near Nottingham
Paget, Henry	. .	Birstall, Leicestershire
Paicey, Robert	. .	Chedgelow, Tetbury, Gloucestershire
Pain, Philip	. .	Boughton House, Kettering, Northamp.
Paley, William Frankland .	. .	Gladdon, near Leeds, Yorkshire
Palmer, Ellis	. .	Caston, Watton, Norfolk
Palmer, George, M.P. . . .	11, King's Arms yd.	Nazing Park, Waltham Abbey, Essex
Palmer, William	. .	East-Garston, Lambourn, Berks.
Palmer, Henry	. .	Brightwaltham, East Ilsley, Berks.
Palmer, John	. .	Hearn, Kent
Papillon, Thomas	. .	Maydeacon, Canterbury, Kent
Parham, William	. .	Sutton-Veny, Warminster, Wilts.
Park, Rev. Waldegrave . .	. .	Ince Hall, Cheshire
Parker, Thomas A. W., M.P. .	9, Conduit-street	Ensham Hall, Witney, Oxfordshire
Parker, Christopher C. . .	. .	Woodham-Mortimer, Maldon, Essex
Parker, Rev. E.	. .	Bicester, Oxfordshire
Parker, Henry	. .	Fairford, Gloucestershire
Parker, Adm. Sir Hyde, Bart..	. .	Melford Hall, Long Melford, Suffolk
Parker, Oxley	. .	Woodham-Mortimer, Maldon, Essex
Parker, Thomas W. . . .	. .	Henley-on-Thames, Oxfordshire
Parker, William	. .	Oxford
Parker, William		
Parkes, J. W. H.	. .	Mawbey Gate, Alresford, Hants.
Parkinson, John	. .	Leyfields, Ollerton, Notts.
Parkinson, Richard . . .	. .	Muskham Villa, Newark, Notts.
Parratt, H. M.	. .	Effingham House, Leatherhead, Surrey
Parrott, G.	. .	Oxford
Parrott, ——	. .	Somers Town, near Oxford
Parry, Samuel	. .	Clanes, nr Worcester
Parry, G. F.	. .	Duisk Lodge, Ayrshire.
Parsons, John	. .	Oxford
Parsons, George	. .	West Lambrook, Langport, Somerset.
Parsons, J. M.	6Raym.Bgs.Gry'sI	
Parsons, William, jun. . .	. .	Wilnecote, Tamworth, Warwickshire
Partridge, Henry Samuel. .	. .	Hockham Hall, East Harling, Norfolk
Passand, Rev. J.	. .	Shipton Charwell, Woodstock, Oxon.
Passmore, Edward . . .	. .	Wraysbury, Staines, Bucks.
†Patterson, W. J.	. .	Durnford Lodge, Wimbledon, Surrey
Paul, W.	. .	Pentney, Lynn, Norfolk

Members.	Town Residence.	Country Residence.
Paull, Matthew	. .	Compton-Paunceford, Wincanton, Som.
Paxton, William	. .	Langford Farm, Bicester, Oxon.
Payn, William	. .	Kidwells, Maidenhead, Berkshire
Peacock, John A.	. .	Osbourn-by-Folkingham, Lincolnshire
Peacock, A.	. .	Ranceby, Sleaford, Lincolnshire
Peacock, Wilkinson	. .	Thorpe, Tilvey, Sleaford, Lincolnshire
Pearse, R. M.	. .	Nill Farm, Hook Norton, Banbury, Oxon
Pearse, George	. .	Harlington, Ampthill, Bedfordshire
Peel, Bolton	. .	Purley, near Reading, Berkshire
Peel, Rev. F.	. .	Culham, Abingdon, Berkshire
Peel, J.	. .	Culham, Abingdon, Berkshire
Peel, Jonathan	. .	Willingham, Lincolnshire
Peel, William	. .	Culham, Abingdon, Berkshire
Peers, Charles	. .	Chislehampton, near Oxford
Pell, Paul Francis	. .	Tupholme Hall, nr Wragby, Lincolnsh.
†Pell, Sir W. Owen	. .	Synell Hall, Northamptonshire
Pell, Edwin	. .	Synell Hall, Northamptonshire
Penfold, Hugh	. .	Annington, Steyning, Sussex
Penoyre, Rev. L.	. .	The Moor, Hay, Herefordshire
Penson, Thomas	. .	Foscott, Oxford
Peppercorn, Henry	. .	Aylesford, Maidstone, Kent
Percival, John, jun.	Albion Club . .	Northampton
Percival, Thomas	. .	Wanford, Northamptonshire
Perkins, Frederick	. .	Chipstead-place, Sevenoaks, Kent
Perkins, Henry	. .	Hanworth Park, Hounslow, Middlesex
Perkins, Joseph	. .	Laughton, Market-Harborough, Leices.
Perkins, Thomas	. .	Willesborough Court, Ashford, Kent
Perry, G. W.	Fore-street, City	
Peters, John Weston	. .	South-Petherton, Somerset.
Peyton, Henry	. .	Stratton Hall, Norfolk
†Philips, J. Burton	10, Park Cresent	
†Philips, Sir George, Bart.	. .	Weston House, Chipping Norton, Oxon.
†Philips, George Richard, M.P.	12, Hill-st., Berk-sq.	
Phillipps, James	. .	Bryngwyn Ragland, Monmouthshire
Phillips, John	. .	Culham, Abingdon, Berkshire
Phillips, John	. .	Charnage Farm, Mere, Wilts.
Phillips, Joseph	. .	Ardington, Wantage, Berks.
Phillips, Richard	. .	Brockton Grange, Shiffnal, Salop.
Phillips, Sir Thomas, Knt.	. .	Newport, Monmouthshire
Phillpotts, Rev. T.	. .	Gwennap, Cornwall
Phipps, John	. .	River, near Dover, Kent
Phipps, Thomas Hele, Jun.	. .	Leighton House, Westbury, Wilts.
Pickering, Leonard	. .	Welcot, Witney, Oxfordshire
Pickin, William John	. .	Whitemoor, Ollerton, Notts.
Pigot, Grenville	. .	Doddershal House, Aylesbury, Bucks.
Pilcher, Charles	. .	Oxford
Pilcher, Jesse	. .	Cheriton Court, Sandgate, Kent
Pillans, William		
Pinckard, John Thomas	. .	Handley, Towcester, Northamptonshire
Pinfold, Charles	. .	Twine, Surrey
Pinfold, John	. .	Oxford
Pinney, William, M.P.	30, Berkeley-sq.	The Park, Somerton, Somersetshire
Pinnix, J. A.	. .	West Dean, Chichester, Sussex
Pinnock, Rev. George	. .	Wyre, near Pershore, Worcestershire
Pinnock, Rev. H.	. .	Moroah, Penzance, Cornwall
Pittman, Rev. T.	. .	Eastbourne, Sussex
Platt, George Edward	. .	Denne Park, Horsham, Sussex
Platt, John Clarke	22, Ludgate-street	
Plestow, C. Berners	. .	Wattington Hall, Downham, Norfolk
Plummer, James	. .	Ensham, near Oxford

Members.	Town Residence.	Country Residence.
Plummer, John	. .	Siddington, Cirencester, Gloucestershire
Pocock, Charles	. .	Sulham, Reading, Berkshire
Pocock, J. Hall	. .	Bothamsted, East Ilsley, Berks.
Polhill, William	. .	Eyford, Stow, Gloucestershire
Poole, Edward	. .	Hornend, Ledbury, Herefordshire
Pope, Edward	. .	Toller-Porcorum, Beaminster, Dorset.
Porter, Edward.	. .	Moor Critchell, Dorset.
Porter, William	. .	Hembury Fort, Honiton, Devon.
Potter, R.	. .	Lydden Court, Dover, Kent
Potterton, J. Faulkner. . .	. .	Stowe, nr Towcester, Northamptonshire
†Powell, Alexander	. .	Hurdcott House, Wiltshire
Powell, George	. .	Boston Road, Brentford, Middlesex
Powell, W.	. .	Marcham, Abingdon, Berks.
Pownall, Henry	. .	Spring Grove, Isleworth, Middlesex
Powys, Henry P.	. .	Hardwicke House, Oxford
Pratt, Sampson.	. .	Bruern Abbey, Oxford
Pratt, William	. .	Newfield, Southam, Warwickshire
Pressly, Charles	Somerset House	
Pretyman, Rev. R.		
Price, Thomas	. .	Gaer, near Brecon, S. W.
Price, H.		
Price, Henry	. .	Heriotts, Hartlip, Sittingbourne, Kent
Pridgold, H.		
Pryme, George, M.P. . . .	. .	Cambridge
Punnet, Rev. J.	. .	St. Gotta, Cornwall
Purchas, R. W.	. .	Pilstone, near Monmouth
Purratt, John	. .	Moins Farm, near St. Albans, Herts.
Purser, John	. .	Willington, near Bedford
Putland, John	. .	Firle Place Farm, Lewes, Sussex
Quantrill, ——	. .	Southampton, Hants.
Quarrell, Thomas	. .	Crossthorne, Worcestershire
Randall, Richard	. .	Tunbridge Wells, Kent
Randolph, Rev. Charles . .	. .	Kimpton Lodge, Andover, Hants.
Ransome, James	. .	Ipswich, Suffolk
Ransome, Robert	. .	Ipswich, Suffolk
Ransome, J. Allen	. .	Yoxford, nr Ipswich, Suffolk
Rason, William	. .	Eastbourne, Sussex
Ravenhill, John	. .	Warminster, Wiltshire
Rawden, C. Wyndham . . .	. .	Eastbourne, Sussex
Rawlence, George Curtis . .	. .	Parsonage, Fordingbridge, Hants.
Rawlinson, A. T.	. .	Chadlington, Chipping-Norton, Oxon.
Reay, John, Jun.	. .	East Dulwich, Surrey
Rebow, Gurdon	. .	Wivenhoe Park, Colchester, Essex
Reid, George	8, Clarter, Regs-pk	Woodmanstone, Ewell, Surrey
Rendlesham, Lord	. .	Rendlesham House, Wickham-Mk. Suk.
Rham, Rev. W. L., M.A. . .	. .	Winkfield, Bracknell, Berkshire
Rhodes, J. A.	. .	Horsforth Hall, Leeds, Yorkshire
Rice, James	. .	Cotton End, Northamptonshire
Rice, Edward Royd, M.P. .	16, Suffolk-street	Dane Court, near Wingham, Kent
Rich, E. W.	. .	Didmarton, Tetbury, Gloucestershire
Richards, James	. .	Dumbleton, Whinchcombe, Gloucesters.
Richards, Rev. Thomas . .	. .	Aberystwith, Cardiganshire
Richardson, William . . .	. .	Great Limber, Lincolnshire
Ricketts, Henry J.	. .	The Grove, Brislington, nr Bristol, Som.
Riddell, Edward	. .	Cheeseburn Grange, Newcast.-on-Tyne
Ridgway, James	169, Piccadilly	

Members.	Town Residence.	Country Residence.
Riddick, William	. .	Cirencester, Gloucestershire
Ridley, Rev. C. J.	. .	University College, Oxford
Rigg, Robert, F.R.S. . . .	2, Chatham-place	
Risley, Rev. W. C. . . .	. .	Deddington, Oxfordshire
†River, John		
Roberts, J.		
Roberts, John L.	. .	Ditchley, Sussex
Roberts, Joseph	. .	Waterperry, Wheatley, Oxon.
Roberts, Robert	. .	Ranceby, Lincolnshire
Roberts, ——		
Robertson, Daniel	13, Austin Friars	
Robins, B.	. .	East Lavant, nr Chichester, Sussex
Robins, Henry	. .	Asps, nr Warwick
Robinson, Michael	. .	Heston, Hounslow, Middlesex
Robinson, Thomas	. .	Oxford
Robinson, Rev. W. B. . . .	. .	Lithington, Sussex
Robinson, William . . .	. .	Albion Place, Hemel-Hempstead, Herts.
Robinson William	. .	Bletsoe, near Bedford
Rodd, F. H.	. .	Trebartha Hall, Launceston, Cornwall
Roden, George	. .	Sutton Maddock, Shiffnal, Salop.
Rodwell, Joshua	. .	Alderton, Woodbridge, Suffolk
Roe, Henry R.	. .	Graton Hall, Yealmpton, Devonshire
Rogers, H.	. .	Boston, Lincolnshire
Rogers, John	. .	Melchbourn, Bedfordshire
Rogerson, John.	Camden Town	
Rogerson, Joseph	Camden Town	
Rolfe, John	. .	Beaconsfield, Buckinghamshire
Rolls, John E. W.		
Romilly, Edward	Somerset House	
Ross, Rev. A.	. .	Westwell Vicarage, Maidstone, Kent
Round, Charles Grey, M.P. .	102, Regent-street	Birch Hall, Colchester, Essex
Round, John, M.P. . . .	. .	Danbury Park, Chelmsford, Essex
Rowland, Richard	. .	Creslow, Buckinghamshire
Rowland, William. . . .	. .	Water Eaton, nr Oxford
Rowles, Charles.	. .	Ledwell Farm, Woodstock, Oxon.
Rowley, R. C.	. .	Holberks, Hadleigh, Suffolk
Royle, J. Forbes, M.D, Prof. K.C.	King'sCol,SomHse	
Ruck, Edmund		
Rumbold, Charles E., M.P. .	22, Chapel-street	Preston Candover, Basingstoke, Hants.
Rusbridger, George . . .	. .	Goodwood, Chichester, Sussex
Rusbridger, John	. .	Goodwood, Chichester, Sussex
†Russell, Lord Chas. J. F., M.P.	6, Belgrave-square	Drakeloe Lodge, Woburn, Bedfordshire
Russell. T. A.	. .	Cheshunt Park, Waltham Cross, Herts.
Ryde, Henry Thomas . . .	. .	Aylesbury, Buckinghamshire
Sadler, Henry	. .	Mid-Lavant, Chichester, Sussex
St. John, Lord	. .	Melchbourn, Higham Ferrers, Northam
†St. Alban's, Duke of . . .	80, Piccadilly. .	Redbourne Hall, Brigg, Lincolnshire
Salomons, David	. .	Broom Hill, Tonbridge, Kent
Salter, T. F.	. .	Great Hallingbury, Essex
Sampson, John	. .	Brympton, Somerset.
Sampson, Benjamin . . .	. .	Tulley Main, nr Truro, Cornwall
Sanctuary, Thomas . . .	. .	Nunnery, nr Horsham, Sussex
Sanders, Henry	. .	Harlestone, nr Northampton
Sanders, Randle	. .	Nimwick House, Cumberland
Sanderson, James Martin . .	. .	Sunbury, Middlesex
Sandford, Mark.	. .	Martin, East Langdon, Dover, Kent
Sandham, Major	. .	Rowdell, Shoreham, Sussex
Sandle, William	. .	Wethersfield Place, Essex

Members.	Town Residence.	Country Residence.
Sandon, Lord	41, Grosvenor-st.	Norton House, Campden, Staffords.
Sandon, Samuel	. .	North Hill, Biggleswade, Beds.
Sanald, S.	. .	Great Cawseston House
Sargeant, Edward	. .	Stamford, Lincolnshire
Sargeaunt, Rev. John	. .	Stanwick, Higham-Ferrers, Northampton
Sarney, E.	. .	Soundess, Nettlebed, Oxfordshire
Satterfield, Joshua	. .	Green Heys, Manchester
Saunders, Samuel	. .	Upton Grove, Tetbury, Gloucestershire
†Saunders, Thomas Bush	6, Brompton-square	Bradford, Wiltshire
Saville, G., Jun.	. .	Cottesmore, Rutlandshire
Savill, Samuel	. .	Bocking, Essex
Savours, William	. .	Headington, Oxford
Sawbridge, Henry B.	. .	East Haddon, Northampton
Scales, John	. .	Hilloughton, Norfolk
Scarth, Jonathan	. .	Shrewsbury, Salop.
Scobell, Capt. R.N.	. .	High Littleton, Bath, Somersetshire
Scotson, Samuel	. .	Toxteth Park, Liverpool, Lancashire
Scott, George Denistoun	. .	Lovel Well, Sunninghill, Windsor, Berks
Scott, Thomas Edward	. .	Carbrooke, Watton, Norfolk
Scudamore, Lieut.-Colonel	. .	Kentchurch Court, Hereford
Seabrook, William	. .	Boreham, Essex
Searle, Alfred	. .	Cambridge
Searle, William	. .	Cambridge
Seawell, Henry	. .	Little Bookham, Surrey
Seawell, Thomas Samuel	. .	Marelands, nr Farnham, Surrey
Selmes, Samuel	. .	Beckley, Sussex
Senior, J. T.	. .	Broughton House, Aylesbury, Bucks.
Seward, Samuel	. .	Weston, Petersfield, Hants.
Sewell, Professor	Royal Veter. Collg.	
Shackel, George	. .	Maple-Durham, Oxon.
Shafto, R. E. Duncombe	. .	Whitworth Park, Rushyford, Durham
Sharp, William	. .	Scarthing Moor, Nottinghamshire
Sharpe, James	. .	Fawley Court Farm, Henley, Bucks.
Sharwood, Dendy	120, Aldersgate-st.	Clapton, Middlesex
Shaw, William, Jun.	. .	Hemsbury Hill, Northampton
†Shawe, R. Fleetwood	. .	Brantingham, Hull, Yorkshire
Shawe, R. N.	. .	Kesgrave Hall, Woodbridge, Suffolk
Shawe, Samuel Pole	. .	Hints Hall, Staffordshire
Sheen, Richard	. .	Oxford
Sheepshanks, Archdeacon	. .	Gluvias, Cornwall
Sheldon, Jonathan	. .	Ensham, nr Oxford
Sheldon, William	. .	Stanton St. John, Oxford
Sheldon, William	. .	Stratford-upon-Avon, Warwickshire
Shepherd, Arthur	. .	Shaw End, Kendal, Westmoreland
Sherborn, George	. .	Ashford, nr Staines, Middlesex
Sherborn, Francis	. .	Bedfont, Middlesex
Sherwood, ——	. .	Purley, near Reading, Berkshire
Sherratt, John Simpson	. .	Lichfield, Staffordshire
Shitler, John	. .	Bradford Farm
Short, T.	. .	Martin, nr Bawtry, Notts.
Shrubb. James	. .	Dorchester, Oxfordshire
†Shubrick, Colonel	. .	The Grove, Leatherhead, Surrey
Shute, ——	. .	Frampton, Cothill, Bristol, Somerset
Shuttleworth, Mark	. .	Tottenham, Middlesex
Silvertop, G.	. .	Minsteracres, Northumberland
Simonds, J. B.	. .	Twickenham, Middlesex
Simonds, W. Barrow	. .	St. Cross, near Winchester, Hants.
Simmons, James	. .	Sutton-Wick, near Abingdon, Berks.
Simpson, H. Bridgman, Jun.	1, Saville-row	Eaton, Retford, Notts.
†Simpson, Hon. John B.	. .	Babworth Hall, Retford, Notts.

Members.	Town Residence.	Country Residence.
Simpson, John	. .	Bardwell, Suffolk
Sims, John		
Sinnell, Richard		
Sitwell, Rev. H. W.	. .	Leamington-Hastings, Southam, Warw.
Skirving, W.	. .	Queen's Square, Liverpool
Skyrme, John	. .	Splot, Cardiff, Glamorganshire
Slack, Joseph Albin	46, Weym.-st. P.pl	Redburn House, St. Albans, Herts.
Slapp, Rev. Thomas Peyton	. .	Old Buckenham Ldg, Attleburgh, Nfk.
Slark, William	155, Piccadilly	
Slater, John J., Jun.	. .	Haslebeech, Northamptonshire
Slatter, William	. .	Stratton, nr. Cirencester, Gloucestershire
Small, Henry	. .	Barfoot, Dorsetshire
Smallbones, Richard H.	. .	Hordley, Woodstock, Oxfordshire
Smart, William	. .	Rainham, Rochester, Kent
Smith, Alexander	. .	Cirencester, Gloucestershire
Smith, Charles Brent	. .	Whaddon, Stroud, Gloucestershire
Smith, Charles Culling	22, Arlington-st.	
Smith, Sir Culling Eardley, Bt.	. .	Bedwell Park, near Hatfield, Herts.
Smith, F.	. .	Hales Owen, Grange, Birmingham, Wks.
Smith, Henry	. .	Drax Abbey, York
Smith, Henry	. .	Heywood Fm., W. Waltham Maidenhd.
†Smith, J. James	. .	Down House, Blandford, Dorset.
Smith, J. Hogan	. .	Forberry Grove, near Newbury, Berks.
Smith, J. P.	. .	Wick, near Worcester
Smith, James	. .	Stanstead, near Chichester, Sussex
Smith, Sir John Wyldbore, Bt.	. .	Down House, Blandford, Dorset.
Smith, Robert	. .	Bingley-on-the-Hill, Oakham, Rutland.
Smith, Robert	. .	Heath Farm, St. Alban's, Herts.
Smith, W.	. .	West Rasen, Lincolnshire
Smith, William	. .	Hemel-Hempstead, Herts.
Smith, ——	. .	Coton, near Northampton
Smyth, George		
Smythies, Carleton	. .	Eye, Suffolk
Smythies, Rev. John Robert	. .	Lynch Court, nr. Leominster, Hereford
Snibson, Richard	. .	Bakewell, Derbyshire
Snow, Benjamin	. .	Sleaford, Lincolnshire
Snow, Johnson	. .	Ewerby, near Sleaford, Lincolnshire
Snowden, Rev. C. C.	. .	Slooe, Sussex
Solly, Samuel, F.R.S.	48, Up. Gower-st.	
Solly, Samuel Reynolds, F.R.S.	. .	Serge Hill, St. Alban's, Herts.
Somes, Samuel	. .	Wollaston, nr. Wellingboro', Northam
Souhter, George	. .	Box Grove, near Chichester, Sussex
Sparks, William	. .	Crewkerne, Somerset.
Sparks, J.	. .	Loseley, Guildford, Surrey
Speakman, Robert	. .	Oxford
Spearman, ——	. .	Newton Hall, Durham
†Spencer, Hon. Capt., M.P.	. .	Althorp Park, near Northampton
Spencer, William	. .	Adderbury, nr. Woodstock, Oxfordshire
†Spencer, Hon. F.	6, King-st. St. James	
Spicer, Thomas	. .	Bockhampton, Lambourne, Berks.
Spicer, John	. .	Esher-place, Surrey
Spong, Ambrose	. .	Manor Farm, Frindsbury, Rochester
Spooner, Professor Charles	Royal Vet. College	
Spooner, Richard	. .	Worcester
Stace ——	. .	Berwick, Sussex
Stacey, William	. .	Burton Farm, Abingdon, Berks.
Stallard, Joseph	. .	Redmarley, Stroud, Gloucestershire
Stanier, Edward	. .	Wroxeter, Shrewsbury, Salop.
Stanier, John	. .	Heaton, near Shrewsbury, Salop.
Stanley, Edward	14, Grosvenor-sq.	

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AS THE

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MARCH 26, 1840.

VICTORIA, by the Grace of God, of the United Kingdom of Great Britain and Ireland, Queen, Defender of the Faith, to all to whom these presents shall come, greeting.

Whereas our right trusty, and right entirely beloved cousin and counsellor, Charles Duke of Richmond, Knight of the most noble Order of the Garter, our right trusty and right entirely beloved cousin, George Henry Duke of Grafton, Knight of the most noble Order of the Garter, our right trusty and right entirely beloved cousin, John Henry Duke of Rutland, Knight of the most noble Order of the Garter, our right trusty and right entirely beloved cousin, George Granville Duke of Sutherland, our right trusty and entirely beloved cousin, Arthur Blundell Sandys Trumbal Marquess of Downshire, Knight of the most illustrious Order of Saint Patrick, our right trusty and right well beloved cousin and counsellor John Charles Earl Spencer, our trusty and well beloved Robert Henry

Clive, Esquire, Sir Francis Lawley, Baronet, and Sir Thomas Dyke Acland, Baronet, our right trusty and well beloved counsellor Sir James Robert George Graham, Baronet, and our trusty and well beloved Henry Handley and Joseph Neeld, Esquires, and others of our loving subjects, have formed themselves into a Society for the general advancement of English Agriculture, and for the purpose of prosecuting the following national Objects, namely:—First, to embody such information contained in agricultural publications, and in other scientific works as has been proved by practical experience to be useful to the cultivators of the soil; second, to correspond with Agricultural, Horticultural, and other Scientific Societies, both at home and abroad, and to select from such correspondence all information which, according to the opinion of the Society, may be likely to lead to practical benefit in the cultivation of the soil; third, to pay to any occupier of land, or other person who shall undertake, at the request of the Society, to ascertain by any experiment how far such information leads to useful results in practice, a remuneration for any loss that he may incur by so doing; fourth, to encourage men of science in their attention to the improvement of agricultural implements, the construction of farm buildings and cottages, the application of chemistry to the general purposes of agriculture, the destruction of insects injurious to vegetable life, and the eradication of weeds; fifth, to promote the discovery of new varieties of grain and other vegetables useful to man or for the food of domestic animals; sixth, to collect information with regard to the manage-

ment of woods, plantations, and fences, and on every other subject connected with rural improvement; seventh, to take measures for the improvement of the education of those who depend upon the cultivation of the soil for their support; eighth, to take measures for improving the veterinary art, as applied to cattle, sheep, and pigs; ninth, at the Meetings of the Society in the country, by the distribution of prizes, and by other means, to encourage the best mode of farm cultivation and the breed of live stock; tenth, to promote the comfort and welfare of labourers, and to encourage the improved management of their cottages and gardens: And have subscribed and expended divers large sums of money in the prosecution of these their national and patriotic objects, being regulated in their purpose by the strictest exclusion from their councils of every question of discussion having a political tendency, or which shall refer to any matter to be brought forward, or at any time pending in either of our houses of parliament: And having such objects, and being regulated by such essential principle, they have humbly besought us to grant unto them, and such other persons as shall be approved and elected in manner hereinafter mentioned, our Royal Charter of Incorporation for the several purposes aforesaid.

Now, therefore, know ye, that we, being anxious of promoting and encouraging by our Royal protection and patronage a series of objects which, prosecuted under the regulating principle of the exclusion of all those questions of debate on which the people of every individual country entertain sentiments so much at variance with each other,

cannot fail to lead to results, affecting in the highest degree the prosperity of our people and the national wealth of our kingdom, have, of our especial grace and favour, given and granted, and do by these presents for us, our heirs, and successors, give and grant that the said Charles Duke of Richmond, George Henry Duke of Grafton, John Henry Duke of Rutland, George Granville Duke of Sutherland, Arthur Blundell Sandys Trumbal Marquess of Downshire, John Charles Earl Spencer, Robert Henry Clive, Sir Francis Lawley, Sir Thomas Dyke Acland, Sir James Robert George Graham, Henry Handley, and Joseph Neeld, and such others of our loving subjects as have formed themselves into, and are now, subscribers of the said Society, or who shall at any time hereafter become subscribers thereof, according to such regulations or bye-laws as shall be hereafter framed or enacted, shall by virtue of these presents be, and for ever hereafter continue to be, one body politic and corporate for the purposes aforesaid, by the name of the "Royal Agricultural Society of England," by which name they shall have perpetual succession and a common seal, with full power and authority to alter, vary, break, and renew the same at their own discretion, and by the same name shall sue and be sued, implead and be impleaded, answer and be answered unto in every Court of us, our heirs, and successors, and be for ever able and capable in the law to purchase, receive, possess, and enjoy to them and their successors any goods and chattels whatsoever, and also be able and capable in the law (notwithstanding the statutes of Mortmain) to take, purchase, possess, hold, and

enjoy to them and their successors a hall, and any messuages, lands, tenements, or hereditaments whatsoever, the yearly value of which, including the site of the said hall, shall not exceed in the whole the sum of Three Thousand Pounds, computing the same respectively at the rack-rent which might have been had or gotten for the same respectively at the time of the purchase or acquisition thereof, and to act in all the concerns of the said body politic and corporate, for the purposes aforesaid, as fully and effectually to all intents, effects, constructions, and purposes whatsoever, as any other of our liege subjects, or any other body politic or corporate, in our United Kingdom of Great Britain and Ireland, not being under any disability, might do in their respective concerns.

And we do hereby grant our especial licence and authority unto all and every person and persons, bodies politic and corporate (otherwise competent), to grant, sell, alien, and convey in mortmain unto, and to the use of, the said Society and their successors, any messuages, lands, tenements, or hereditaments, not exceeding such annual value as aforesaid.

And know ye further, that in granting this our Royal Charter to the said Royal Agricultural Society of England, we do hereby declare it to be our full and entire will and pleasure that we extend our Royal protection to its national objects, under the condition that a principle of its constitution shall be the total exclusion of all questions at its meetings, or in its proceedings, of a political tendency, or having reference to measures pending, or to be brought forward, in either of our houses of Parlia-

ment, which no resolution, bye-law, or other enactment of the said body politic and corporate, shall on any account or pretence whatever be at any time allowed to infringe.

We further declare, that the number of Subscribers of the said body politic and corporate shall be indefinite, but classed according to their election or rate of payment into governors and members, with such individual privileges as shall appertain respectively unto each, there being added to the Society such honorary, corresponding, and foreign members as may be found desirable for the promotion of its several objects.

It is also our will and pleasure, that there be three general meetings of such governors and members of the said Society held in each year, namely, two of these general meetings in London, in the months of May and December, and the other in such other part of England or Wales as shall be deemed most advantageous in time and place for the advancement of the objects of the Society. We further will and declare, that at such general meeting in London, to be held on the twenty-second or (should that date fall on a Sunday) on the twenty-third day of May; the governors and members shall have full power to elect a president and council, which president and council, although then duly elected, shall, nevertheless, not come into office until after the day of the annual country meeting next following, and shall then continue from that day in their respective offices and appointments for one year (more or less according to the date of the

next annual country meeting); all vacancies occurring in such offices and appointments by resignation, death, or otherwise, to be filled up by election, and the majority of votes of the remaining members of such president and council. That the council shall consist of one president, twelve trustees, and twelve vice-presidents, to be elected from the class of governors only, and of fifty other members to be elected indiscriminately from the governors and members of the Society: That the president shall be an annual officer of the Society, and not re-eligible to the office of president for three years. And further, that twenty-five of the fifty general members of the council shall go out by rotation each year, but may be re-elected.

We further will, declare, and grant, that such general meeting in May shall have the full power and privilege of electing the president, trustees, vice-presidents, and other members of the council, from the governors and members as aforesaid, and that such president, trustees, vice-presidents, and council, shall be regulated in their proceedings by such bye-laws as may and shall, from time to time, be enacted by them conformably with the tenor of these letters patent, no established bye-law however, being in any case altered, or new one proposed, without at least one month's notice of such intention being given to each member of the council. Further, that such president and council so elected shall have the power both to appoint, and as they may think fit, to remove, one general secretary to the Society, who will be responsible to them for the execution and discharge of

the various duties required of him as defined from time to time by their bye-laws or special resolutions. And we further will and declare, that the said body politic and corporate, may by him as their secretary sue or be sued, contract or discharge in their name and on their behalf.

We further will and declare it as our royal pleasure that the said Charles Duke of Richmond shall be the first president of the said Royal Agricultural Society of England, and that he, with the said George Henry Duke of Grafton, John Henry Duke of Rutland, George Granville Duke of Sutherland, Arthur Blundell Sandys Trumbal Marquess of Downshire, John Charles Earl Spencer, Robert Henry Clive, Sir Francis Lawley, Sir Thomas Dyke Acland, Sir James Robert George Graham, Henry Handley, and Joseph Neeld, shall be members of the first council, any three or more of whom shall hereby be invested with full power, being first duly summoned to attend, to appoint on or within ten days preceding or following the twenty-fifth day of the present month of March, such persons to be trustees, vice-presidents, council, governors, members, honorary members, corresponding members, and foreign members, as they shall respectively think fit.

And we further will, grant, and declare, that the president and council shall have the sole management of the income and funds of the said body politic and corporate, and also the entire management and superintendence of all the other affairs and concerns thereof, and shall, or may, but not inconsistently with, or contrary to, the pro-

visions of this our Charter or any existing bye-law, or the laws or statutes of this our realm, do all such acts and deeds as shall appear to them necessary or essential to be done, for the purpose of carrying into effect the objects and views of the said Royal Agricultural Society of England.

In witness whereof we have caused these our Letters to be made patent. Witness ourself at our palace at Westminster this twenty-sixth day of March, in the third year of our reign.

By Writ of Privy Seal.

(Signed) EDMUNDS.

BYE-LAWS AND REGULATIONS.

May 6, 1840.

Objects, Constitution, and Condition of the Society.

The Royal Agricultural Society of England has been founded for the object of perfecting the system of English Agriculture by the union of practice with science, and the collection and dissemination of new and important facts having reference to the capabilities and cultivation of the soil, the theory of crops and general management of agricultural produce, the improvement in the breed of stock and treatment of their disorders, the gradual perfection of the various operations and implements of husbandry, and the amelioration of the condition of the English labourer in relation both to his domestic comforts and moral improvement. The Society consists of an indefinite number of Governors and Members, who have the free power and privilege of electing at each Anniversary Meeting a Council, formed of one President, twelve Trustees, twelve Vice-Presidents, and fifty other Members, regulated in their proceedings by bye-laws from time to time enacted, and to whose care the entire management of the Society is intrusted, such President and Council reporting at two General Meetings held in each year the general state of the affairs and progress of the objects of the Society. The exclusion from the discussions of the Society of all topics of a political tendency, or having reference to questions pending or about to be brought forward in either of the houses of Parliament, has been the recognised principle of the Society from its original establishment, and this political and legislative neutrality has been made a permanent condition by the terms of Her Majesty's royal charter. It is also a rule of the Society that the discussion of all questions affecting the mutual relation of landlord and tenant shall be waived by the Society.

Governors and Members.

Every candidate for admission into the Society must be proposed by a Member, the proposer to specify in writing the name, rank, usual place of residence, and nearest market-town of the candidate; every

such proposal shall be read at the first Meeting of the Council next after such candidate shall have been proposed: every such candidate shall be eligible at the then succeeding meeting. Governors pay an annual subscription of 5*l.*, and Members of 1*l.*, all subscriptions being considered as due on the 1st of January in each year; but when the election takes place in December no claim is made for the subscription of that year. Members may compound for their lives,—Governors by paying 50*l.*, Members by paying 10*l.* On and after the 1st of January in every year the subscriptions due at that date in the past year, and remaining unpaid, are regarded as in *arrear;* and no Member whose subscription is so in arrear shall enjoy any of the privileges of the Society, nor will any such Member be allowed to enter into a composition for his future payments, until such arrear be paid. No Governor or Member shall be allowed to transfer his name from one class of Members to the other respectively without the express leave of the Council. Governors have the privilege of attending and speaking at all Meetings of the Council, but not of voting, unless forming part of such Council; and from the class of Governors only are elected the President, Trustees, and Vice-Presidents of the Society. All Members are entitled gratuitously to the volume of the Journal in the course of publication at the date of their election, and to all subsequent numbers; and have the privilege of inspecting all models presented to the Society, and of referring to the books in the library.

An Alphabetical Register shall be kept of all the Governors and Members, exhibiting the date of their election, and the subscriptions due or received from them, with the dates respectively of arrear and payment.

Honorary Members shall from time to time be elected by the Council from such distinguished individuals as have rendered eminent services to the Society by their influence or disinterested exertions in promoting its objects; such Honorary Members having the privileges of Governors, but not being liable to any claim for subscription.

General Meetings.

The Anniversary Meeting for the election of the President and Council shall be held on the 22nd, or, should that date fall on a Sunday, on the 23rd day of May in each year, public notice of the meeting being given at least one fortnight previously by advertisement in the public papers; at such meeting all elections shall be determined by a show of hands; the President shall be an annual officer of the Society, and not re-eligible to the office of President for three years; and twenty-five

of the fifty general Members of the Council shall go out by rotation in each year, but may be re-elected:—the President and Council so elected shall not, however, come into office until the day after the Annual Meeting in the country.

The General Meeting of the Society in London in December, and the Annual Meeting in the country, shall be held at such time and place as shall be decided upon by the Council, due notice being given of such Meetings.

At the Anniversary and General Meeting, Reports from the Council will be read. Only Members, or individuals bearing the President's written order, will be allowed to be present, each giving his name in writing on being admitted.

The President.

The President shall be proposed and elected at the Anniversary Meeting from the class of Governors, and shall not be re-eligible to the office of President for three years from the expiration of his year of office. In all the official relations of the Society he shall take precedence of all other Governors, Members, or Honorary Members, and shall have full power to summon at his pleasure Meetings of the Council, and shall take the chair at every Council when present, he, and every other chairman of the Society, having the privilege of a casting vote in all cases of equality in the division on any question, authorising, by his signature, letters informing new Members of their election, votes of thanks, and such other documents as the Council may direct, in the name and on the behalf of the Council.

The Council.

The Council shall hold a General Meeting on the first Wednesday in every month at twelve o'clock, at the rooms of the Society; and shall also meet by adjournment on every Wednesday at the same hour; unless such monthly or weekly meetings be specially adjourned: such meetings to be held by common understanding and without summons; but, should at any time the business of the Society require a Special Council to be held at any other time or place, the President shall have full power to direct such a Council to be summoned, at such time and place and with such notice as he may think fit; but, in his absence, one Trustee, together with one Vice-President, and three other Members of Council shall have power to summon the Council, in cases of emergency, on delivering to the Secretary their written order for issuing

the summonses, and allowing not less than seven days to elapse between the date of summons and the day appointed for the meeting of such Council. The Monthly Meeting of the Council shall have the full power of originating, discussing, and deciding, by the majority of votes, on a show of hands, all questions brought before it on the business of the Society. Should, however, any Member then present regard any proposition brought forward as too important for immediate decision, he will be at liberty to take the sense of the Meeting whether such proposition should be postponed, in order that it may be duly discussed at the next Monthly Meeting; and should one-third of the Members present agree with him on that point, such proposition shall be postponed, and due notice of such motion and postponement shall be given to all Members of the Council by the Secretary.

The Weekly Meeting of the Council shall have the power of discussing all topics referred to them by the Monthly Meeting, or connected with the operations of the Committees in progress, and of deciding on all questions by a majority of votes, such decisions, however, shall not remain in force unless confirmed by a Monthly Meeting.

In the absence of the President the chair shall be taken by a Trustee or Vice-President, and should neither of such officers be present, then by such Member as the Council shall choose as their Chairman by the majority of votes. The Quorum of a Monthly Council shall be formed by five, and that of a Weekly Council by three Members of Council. At every Meeting of the Council the minutes of the previous Meeting shall be first read, and postponed matters shall take precedence in the order of business of new motions, excepting in the case of a Report from the Finance Committee, which shall always be taken first into consideration. All minutes or reports read at the Council shall receive the Chairman's signature.

Committees.

All Committees shall be appointed by a Monthly Council, and shall be considered as becoming extinct at the Annual Meeting in the Country, the first Council after that date reviving such Committees as the business of the Society may in their opinion then require. Each Committee, at its first Meeting shall elect its own permanent Chairman, the Chair being taken in his absence by a Special Chairman, to be elected for the occasion; and all Committees shall meet by summons issued by direction of their respective Chairmen, or the President, or of any three Members of a Committee, or by adjournment. The President, Trustees, and Vice-Presidents, are Members ex-officio of all Committees.

All Committees during their sittings shall report the progress of their proceedings at each Monthly Meeting of the Council, when the recommendations of their Reports will undergo consideration.

Secretary.

The Secretary shall devote the whole of his time to the affairs of the Society, and shall be immediately responsible to the President and Council for the discharge of the various duties they require him to perform. He shall attend the sittings of all Meetings of the Council and Committees, and take their minutes. He shall conduct the correspondence of the Society, preserving the letters he may receive in a classed arrangement, and retaining copies of those which he writes by direction of the Council or Committees. Under the direction of the Journal Committee he shall perform the duties of responsible Editor of the Journal, and translate from foreign languages such important papers published abroad as it may be considered desirable to transfer to the pages of the Journal. Under the direction of the Finance Committee he shall receive or be responsible for all moneys received at the rooms of the Society, paying such sums into the hands of the Bankers, and producing at each Finance Committee their receipts for the same. He shall also have the charge of the expenditure of petty cash, the immediate superintendence over the Clerks, and the custody of all books, models, and papers belonging to the Society. Agreeably with the Charter, the President and Council have the power by him as their Secretary of suing or being sued, and of contracting or discharging obligations, according to the special nature of the authority with which they may from time to time invest him as their representative for these several objects.

Finances.

The Finance Committee shall have the immediate care of the Society's accounts, and no payment of money shall be made excepting at a Monthly Council, and unless recommended by the report of this Committee, which shall always meet on the first Wednesday in every month previously to the sitting of the Council in order to prepare a report on the state of the Society's funds, which they shall present to each monthly meeting. The Secretary shall issue a summons to each Member of the Finance Committee and lay before it, at its Meeting, the following accounts :—

DATE to 1840.			
	£. s. d.		£. s. d.
Amount of Cash received during the past month by the Secretary, and paid into the hands of Messrs. Drummond, as per Bankers' receipts		Payments by order of the Council	
Ditto, received by Messrs. Drummond on account of the Society, as per Bankers' book		Amount of expenditure of Petty Cash	
Balance of Petty Cash in the hands of the Secretary .			
Balance at the Bankers' .		Outstanding Bills . . .	

and all the books in which entries of cash receipts or payments are made, along with whatever documents the business of the day may require. Should a sufficient number of Members to form a quorum not have assembled on the first Wednesday of any month, the Secretary shall report the balance sheet of the Society's funds to the Council.

The Finance Committee have the power of employing, at their pleasure, a professional Accountant, to examine and check on their behalf the account-books of the Society. Twice in every year there shall be an audit of accounts held immediately before each General Meeting in May and December; and the balance sheet which shall be reported in each case shall be published in the ensuing part of the Journal; the Audits shall be composed of the President and three Members of the Finance Committee, and of three Members, chosen at the Anniversary and General Meetings from the general body of the Society, and not Members of the Council or of any of the Committees, and shall meet at Eleven o'clock on the Friday previous to the respective half-yearly meeting; the Trustees of the Society shall be ex-officio Members of such audits.

All drafts of money shall be signed by the President (or, in his absence, by the Chairman of the Council) and by one of the Trustees, being counter signed by the Secretary; and a book shall be kept in which a consecutive entry shall be made of all such payments.

Journal.

The Journal Committee shall have the care of the publication of the Journal, and the Secretary shall act as their responsible editor. They shall decide on the papers which shall be printed in the successive parts of the Journal, and shall also recommend, at their discretion, the disposal to be made of communications important or interesting in their nature, but of a character unsuitable for the immediate objects of the Journal. The Committee, though responsible for the selection of matter, and the importance of its bearings in an agricultural point of view, are not responsible for the positive accuracy of the facts stated in the several papers,—a circumstance depending on the judgment, caution, and observation of the authors themselves.

Each Subscriber whose payments are not in arrear is entitled to the current volume of the Journal and the parts published after his election; and, although the copies may always be obtained on application for them at the Society's apartments, the Council are desirous that the Members should afford every information that may facilitate their systematic transmission throughout the kingdom, free of carriage, to central parties in each district.

Rules of Competition for Prize Essays.

1. That all information contained in Prize Essays shall be founded on experience or observation, and not on simple reference to books or other sources.

2. That drawings, specimens, or models, shall accompany writings requiring them.

3. That all competitors shall transmit a sealed note, containing their names and addresses, with a motto on it to correspond with one inscribed on the Essay.

4. That the Society shall have the power to publish the whole or any part of the Essays which gain the prizes, and the other Essays will be returned on the application of the writers.

5. That the Society is not bound to give an award unless they consider one of the Essays worthy of a prize.

6. That in all reports of experiments the expences shall be accurately detailed.

7. That only the imperial weights and measures are those by which calculations are to be made.

8. That no prize be given for any Essay which has been already in print.

9. That prizes may be taken in money or plate at the option of the successful candidate.

10. That all Essays be addressed to the Secretary at the apartments of the Society.

Library and Museum.

There shall be two Libraries of the Society—one for the reception of agricultural works, and the other for that of miscellaneous publications; and all donations of books shall be referred to the Journal Committee to decide whether the books shall be accepted, and, if accepted, to which of the classes respectively the several works shall be assigned. A register shall be kept in which an entry shall be made of all presents of books, seeds, implements, and models, together with the names of the donors; but a list of such presents only as are in accordance with the objects of the Society shall be printed in the concluding part of each volume of the Journal.

No model, implement, or other object, can be exhibited to the Society without leave from the Council.

Bye-Laws.

No established bye-law shall be altered, or new one proposed, unless one month's notice has been given in writing to the Council, and a copy of such notice transmitted by the Secretary to each of its Members.

Passed at a Council held on the 6th of May, 1840.

RICHMOND, President.

Royal Agricultural Society of England.

GENERAL MEETING,

5, Cavendish Square, May 22, 1840.

REPORT OF THE PRESIDENT AND COUNCIL.

Only two years have now elapsed since the formation of the English Agricultural Society; and the Members, in again holding in these rooms their Anniversary Meeting, have to congratulate themselves on the unexampled manner in which the principles, objects, and constitution of the Society have been brought securely into a condition of permament and effective operation, and the Society itself placed in a position for carrying out in succession all those national objects, originally contemplated at its establishment, in reference to the improvement of English Agriculture.

The Queen's Royal Charter of Incorporation, and Her Majesty's Gracious Patronage of the Society have now given to it, as a public body, a character of permanent stability, and conferred on it all those corporate privileges requisite for the due working and successfully carrying into execution of its original intentions: and your President and Council have, in your name, already conveyed to Her Majesty their unanimous thanks for this gracious and abiding mark of Her Majesty's favour towards the Society.

The Charter of the Royal Agricultural Society of England, independently of its peculiar privileges in a corporate sense, is simply founded on your own established principles, as recognised from the origin of the English Agricultural Society; and the Bye-Laws which your Council have framed, under the powers vested in them by the Charter, have been drawn out as nearly as

possible in accordance with the previously existing Regulations of the Society—thus, merely incorporating the power and privileges of the Charter with the principles and regulations you had already recognised and adopted.

Finances.

At the General Meeting in December last, a large amount of subscriptions was announced as being in arrear, and the Council are happy to find that the confident expectation they then expressed, respecting the final payment, has been fully justified by the liquidation of more than half of that amount; and that while some few of the Members who were applied to for payment of their subscriptions so in arrear have signified their wish to withdraw from the Society, on the ground that their first year's subscription was intended only as a donation to the funds of the then infant establishment, and not as an annual contribution, a considerable number of the other Members, to whom application was made on the same occasion, have either compounded for life or given permanent orders on their bankers, to obviate the future omission of due and regular payment in each succeeding year. The Council have not only the pleasure of recording a rapidly increased amount in the number of Members, from every part of the kingdom, who continue to enrol their names weekly in the list of the Society; but also of stating that the present available income, from interest on invested stock in the funds and current subscriptions, is fully equal to the demands on the Society and the liabilities at the ensuing Cambridge Meeting.

Your Cambridge Committee have been indefatigable in the business entrusted to them, and unceasing in their interest to perfect the arrangements for the successful issue of the Meeting. They have already decided on the plans to be adopted, the contract to be entered into, and the distribution of the numerous details into the hands of three Sub-Committees; namely, for the dinner, the cattle-yard, and the trial of implements; and they are now actively proceeding, in concert with their colleagues on the Committee—who reside in the immediate vicinity of Cambridge,

and direct on the spot the immediate carrying out of their instructions—to complete their arrangements for the Meeting in that town; where, they have the pleasure of stating, every disposition is manifested, on the part of the heads of the colleges, the mayor and corporation of the town, and the nobility and gentry of the neighbourhood, to promote, to the utmost of their power, the objects of the Society, and the general comfort and convenience of the Members who are expected to be present on that occasion. A Special Council has been held for the purpose of taking into consideration the propriety of increasing the number and amount of the premiums for Cart Horses and Mares; and they have decided that the premium to be awarded at Cambridge for the best Cart-Stallion shall be raised from 20 to 30 sovereigns; and the premium for the best Cart-Mare and Foal raised from 10 to 15 sovereigns.

Your Journal Committee have been actively engaged in the preparation of the new part of the Journal, which will complete the first volume of the publication, and make its appearance on 15th of June. They have also presented to the Council their Report on the plan of a model experiment, to be tried on the different farms of nine Members of the Society; the same mode of cultivation to be strictly adhered to in each case, and the only difference to subsist in the soil and locality of the respective farms: the first trial selected being that on the growing of Swedish Turnips.

Your Geological Committee have had two meetings; and the Council, regarding our knowledge of the nature of the subsoil as next in importance to our acquaintance with the soil itself, have peculiar pleasure in recording the lively interest with which three of your Honorary Members have taken up the question of the connexion between agricultural produce and geological formation; and of stating that the Rev. Dr. Buckland, President of the Geological Society, Roderick Impey Murchison, Esq., Vice-President of the Royal Society, and Henry Thomas De la Beche, Esq., Director of the Ordnance Geological Survey, have each undertaken a gratuitous survey for the Society; namely, in the

Vale of White Horse, in Berkshire; in the Weald of Sussex; and in Glamorganshire, respectively; with no other expence to the Society than that attending the analysis of the soils, and the engagement of agricultural guides to accompany these gentlemen over the districts under survey, and explain to them the nature and value of the crops.

An alarming epidemic having made its appearance, a few months since, among the dairy-cattle of the metropolis, and extended itself into various parts of the country, attacking also more recently both sheep and pigs, the Council immediately decided on steps to be taken for placing in the hands of their Members such information as might be useful in directing them in the treatment of the disease. The Veterinary Committee having concerted with Professor Sewell, of the Royal Veterinary College, a concise statement of the symptoms and remedies, a printed copy was at once addressed by post to every Member whose address was known; and the Council have not only the satisfaction to learn that this step on their part has met with the cordial approbation of theMembers of the Society at large, but that the epidemic, although attacking the majority of the herds and flocks in the infected districts, and depreciating to a considerable extent the condition and value of the stock, has not been so fatal as might have been apprehended; and has been found to yield, in most cases, to the speedy application of the remedies proposed, and others of a similar character.

The Council, in conclusion, beg to lay before you the detailed statements of the Receipts and Payments of the Society during the last half-year, and an estimated balance-sheet of the future income and expenditure of the establishment.—The Society now consists of 2569 Members.*

RICHMOND, President.

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* At the present date, June 24, 1840, the number has amounted to 2860; and the Society now consists of 189 Annual Governors, 86 Life Governors, 2434 Annual Members, 146 Life Members, and 5 Honorary Members.

STATEMENT OF THE RECEIPTS AND EXPENDITURE OF THE ROYAL AGRICULTURAL SOCIETY OF ENGLAND.

From December 1st, 1839 to May 16th, 1840.

RECEIPTS.

		£. s. d.
Balance in hand on the 1st of December, 1839		509 11 2
By Life Governors' Compositions	£400 0 0	
Life Members' Compositions	360 0 0	
		760 0 0
By Annual Subscriptions:—		
Due May 10, 1838,		
From Governors	15 0 0	
From Members	8 0 0	
		23 0 0
Due January 1, 1839—		
From Governors	335 0 0	
From Members	268 0 0	
		603 0 0
Due January 1, 1840—		
From Governors	335 0 0	
From Members	604 9 0	
		939 9 0
Due January 1, 1841—		
From Members	2 0 0	2 0 0
Amount of Subscriptions paid into the Bank of Messrs. Drummond, but in names unknown		25 0 0
Half-yearly Dividend on £4000 Stock in the 3¼ per Cents., due January 5, 1840		70 0 0
Mr. Murray's Balance of Account on the Publication of the Journal		26 16 1
By Miscellaneous Receipts		1 19 0
Total Amount of Receipts		£2960 15 3

Examined by the Finance Committee,

DAVID BARCLAY, Chairman.

EXPENDITURE.

		£. s. d.
For the Charges of Management: namely—		
Advertisements	£21 15 0	
Stationery	22 9 3	
Postage of Letters, Carriage of Parcels, Books, Maps, &c.	80 18 9	
Printing Journal, Wood-Engraving, and Lithography	276 6 0	
Salaries of Secretary and Editor, Clerk, and House-keeper (Six Months to May 1, 1840)	236 0 0	
Mr. Symonds, Accountant, for Eight Months' Services	66 13 4	
Half-year's Rent to Lady-day, 1840	175 0 0	
Miscellaneous Charges	10 3 1	
Coals, Candles, Office Furniture, Repairs, Hire of Seats for General Meeting, and of Lamps for Smithfield Show Week, &c.	33 8 11	
		922 14 4
For Premiums and Grants: namely—		
Captain Carr, for his Prize Essay on Rural Economy Abroad	25 0 0	
Mr. Langston, for his Prize at Oxford	5 0 0	
Mr. Griffiths, Star Hotel, Oxford, Balance of Account	3 10 2	
Awards for the Three best Cambridge Plans	35 0 0	
Mr. Hanks, for making Three Copies of the Cambridge Plans	3 3 0	
Grant to the Veterinary College; one Half-year to Lady-day, 1840	100 0 0	
Fees paid on obtaining the Charter	337 17 0	
		509 10 2
Total Amount of Payments		1432 4 6
To be invested in the 3¼ per Cent. Stock		760 0 0
Balance in favour of the Society on the 16th of May, 1840		768 10 9
		£2960 15 3

Approved by the Council,

RICHMOND, President.

ESTIMATED INCOME AND EXPENDITURE FOR ONE YEAR.

Cr.

	£.	s.	d.	£.	s.	d.
Annual Subscriptions:—						
From 189 Governors, at £5	945	0	0			
From 2434 Members, at £1	2434	0	0			
				3379	0	0
Annual Interest on £4700 Stock in the $3\frac{1}{2}$ per cents.				164	10	0
				£3543	10	0

Dr.

	£.	s.	d.	£.	s.	d.
Establishment:—						
Salary of Secretary and Editor	400	0	0			
Ditto of Clerk and Accountant	100	0	0			
Ditto of Housekeeper	52	0	0			
Annual Rent of House	350	0	0			
				902	0	0
Permanent Charges:—						
Printing Journals	500	0	0			
Grant to the Veterinary College	200	0	0			
Stationery	100	0	0			
Miscellaneous	100	0	0			
				900	0	0
Annual Country Meeting:—						
Amount of Prizes offered for Competition	1050	0	0			
Excess of Expenditure over the Receipts at Cambridge	500	0	0			
				1550	0	0
Balance in favour of the Society				191	0	0
				£3543	10	0

DAVID BARCLAY, CHAIRMAN.

RICHMOND, PRESIDENT.

EPIDEMIC AMONG CATTLE.

The President and Council having referred the consideration of the subject of the present epidemic among cattle, &c., to the Veterinary Committee to report a concise and practical Statement of its symptoms and treatment, for the information of the members, the committee, in concert with Professor Sewell, have drawn up the following recommendations of the simplest remedies at present in use for arresting the progress of the disorder; but, as the object of the council is to collect as well as to disseminate information, and inasmuch as the disease varies in its character according to locality and the circumstances under which the animals are placed, the council request that, should any cases occur dissimilar from those described, or any other remedies be found efficacious, they may be fully communicated to the Secretary.

REPORT.

5, *Cavendish Square,*
April 8, 1840.

This disease, like the epidemic, or influenza, among horses during the spring of 1836, being in many instances of a slight nature, the constitution does not always suffer from fever, either of the typhus kind or of an inflammatory character, and recovery takes place without the administration or application of medicinal agents. The attack does not always commence in the same form, but ultimately terminates in a general disease of the same type and character; in some animals it commences in the feet, between the claws, and in others it appears to have begun in the mouth; in others a stiffness in the legs of the animals is first perceived, as if treading upon thorns and briars; then follows a discharge of saliva from the mouth, and a champing of the lips, accompanied

with blisters on the tongue, palate, and lips; the blisters peel off, loss of appetite and general debility ensue.

As the disease appears occasionally to partake both of inflammatory action, and also to assume the appearance (if neglected) of a low fever, Professor Sewell, of the Royal Veterinary College, recommends, in the first place, strict attention to the regimen, dry and warm lodging, fresh air, giving the cattle plenty of dry bedding, and keeping them clean.

From all the information received by the Society, the disease appears to commence with slight inflammatory action, in which case the farmer should immediately take measures to check its progress by the administration of sulphur combined with Epsom salts, or other mild aperients, as castor-oil, cold drawn linseed-oil, aloes, &c.; and, should cough or difficulty of breathing denote an attack of fever, bleeding may be resorted to; but, if the symptoms do not yield to this treatment, the owner should immediately apply to the most experienced veterinary surgeon in his neighbourhood; and, if such a one should not be at hand, Professor Sewell recommends the following treatment:—

MOUTH, TONGUE, PALATE, LIPS, AND THROAT.

For the blisters of the mouth, &c., the most simple remedy will be found to be a weak solution of sulphate of copper (blue vitriol), in the proportion of one ounce to a pint of water. This lotion will be found useful for the blisters which appear in any other parts of the body, excepting the feet, in which case poultices are preferable as allaying the pain and inflammation. If sore throat attends the attack, apply a seton under the throat.

FEET.

Pare away that horny part of the hoof which has become separated from the foot by the disease, and then apply, in the first instance, a warm poultice of bran, oatmeal, or linseed-meal, followed by the use of fomentations of milk-warm water, and continue this treatment until the inflammatory symptoms are abated. Then use the lotion above mentioned. In some cases

of foul ulceration, and the appearance of proud flesh, apply a saturated solution of blue vitriol.

Remark.—The feet are found to do best by being left unbandaged, and the animal should be allowed a good bed of clean dry litter.

TEATS AND UDDER.

These require the same application of fomentations and lotion as in the case of the feet.

Remark.—The milk should be drawn three or four times a-day, to relieve the udder of that painful distention which appears to cause the formation of milk abscess (called garget). This abscess, when formed, should be fomented as before, opened with a lancet, and dressed with digestive or drawing ointment; abscesses in any other part of the body are to be likewise freely opened and treated with the same applications; and in every case they ought to be examined and cleaned twice a-day.

SORES AND ULCERS UPON THE BODY OR LIMBS.

To be washed with the saturated solution of blue vitriol.

LUNGS AND CHEST.

When the lungs appear to be affected by shortness or difficulty of breathing, by laborious heaving of the flank and quick pulse (from sixty and upwards), coldness of the horns, ears, and muzzle, bleed from the neck according to the age, size, and strength of the animal; insert a seton in the dewlap near the chest.

Medicinal Treatment.—Mild aperients, namely, either four ounces of sulphur in warm gruel, or half a pint of cold drawn linseed oil alone, or six ounces of Epsom salts dissolved in a quart of warm water. When the bowels are opened, give a cooling diuretic, such as an ounce of saltpetre dissolved in a pint of warm water.

LIVER.

If a yellowness of the eyes and mouth, with a confined state of the bowels, show the liver to be affected, proper doses of calomel

should be administered in conjunction with the aperient purgatives. One drachm by weight of calomel will be sufficient for a dose.

STOMACH AND BOWELS.

To correct acidity and tendency to putrescence in the food obstructed in the stomach and bowels, give one ounce of common pearlashes or washing soda dissolved in gruel, to which is to be added half an ounce of powdered ginger, the whole mixed with warm ale; and when much inward pain or uncomfortable feeling is evinced by the animal, one ounce by measure of laudanum may be added. Should irritation exist in the bowels, as shown by the animal's shifting about, lying down, looking at the flanks, and moaning, apply hot cloths to the under part of the belly, and as soon as possible a blister (either in the form of liquid or ointment).

KIDNEYS.

Should the urine appear tinged with blood, denoting some affection of one or both kidneys, apply hot fomentations to the back and loins, or a fresh sheep-skin with the inside placed upon the back of the animal; avoid all diuretic medicine, and give drink sparingly.

GENERAL TREATMENT.

A general rule cannot be safely recommended by which to combat the disease in all situations; the more vigorous constitution of cows in the country having been successfully treated by the active depletion of bleeding and purgatives, which have, on the contrary, proved fatal in the plethoric but enervated cows of the London dairies; but in every case too great a stress cannot be laid on the absolute necessity of the strictest cleanliness; and, with regard to the diet, mucilaginous drinks will always aid recovery, as oatmeal, linseed (whole or bruised), starch; either of these being boiled with water into a thick gruel; and the best produce of the farm ought to be given for the food of the diseased animal. When the disease has been subdued, leaving the animal in a weak state, a chalybeate tonic will be found of much use, namely, an

ounce of sulphate of iron (commonly known in the country as green copperas), dissolved in a pint of warm water, twice a-day. As the disease rapidly changes in its character, it will be highly necessary to apply the remedies in the earliest possible stage of the disorder.

N.B.—Sheep.—The foregoing treatment applies to sheep, taking into consideration the local circumstances under which they are placed, care being taken that the doses are moderate and suitable to sheep.

In addition to these remedies of Professor Sewell, the committee would strongly recommend the disordered animals to be kept apart from the other stock, as there is much doubt whether the disease does not partake both of an epidemic and infectious character.

June 6, 1840.

Professor Sewell has reported to the Society that a seton of common coarse tape run through the dewlap has, in almost every case, prevented the udder from becoming affected and the milk from going.

Mr. Youatt has also informed the Council that a good thorough dose of Epsom salts (from a pound to a pound and a quarter) has been found of the greatest service in checking the disorder in its first stage; a second and smaller dose of the same salts (three-quarters of a pound), mixed with six or eight ounces of flour of sulphur, being given, if necessary, in the course of two days afterwards.

*** The Society would particularly recommend that the animals, as soon as affected, should have their ground changed, and be immediately put in a state of quarantine from the remainder of the stock.

RICHMOND, President.

MODEL EXPERIMENT ON THE GROWING OF SWEDISH TURNIPS.

REPORT.

The Journal Committee are desirous to simplify the Experiment on Manures, which they lately laid before the Council,[*] and in which nine Members of the Society have now agreed to join.

Conditions.

Seed—" Purple-top " (to be procured of Mr. Thomas Gibbs, Half-Moon Street, Piccadilly).

Manures—Dung, 20 tons per acre.
Bones, 20 bushels per acre.
Poittevin's manure, 26 bushels per acre.

Distances between the rows, 18 inches and 27 inches. If it be desired to allot half an acre to each kind of manure, and the half acre be divided into two lots for the two breadths of rows, there will be six trial lots, each of one quarter of an acre.

Where the rows are at 18 inches' distance, if they are 110 yards in length, there will be 22 such rows in each single lot; to which 5 tons of dung, 5 bushels of bones, and 6 bushels of Poittevin, will be severally applied.

Where the rows are 27 inches' distance, $14\frac{1}{3}$ rows will be the extent of each lot, which will receive the same quantities of manure.

PH. PUSEY, Chairman.

REPORT OF THE GEOLOGICAL COMMITTEE.

The Geological Committee, believing that it may be useful to members of the Society who are endeavouring to trace the connexion of agriculture with geology that those points should be brought together in which an agricultural distinction between different strata may be expected, beg to lay before the Council the following heads of inquiry:—

I.—1. Grasses; 2. Herbs or Weeds; 3. Undergrowth, as Heath, Furze, or Fern; 4. Trees; either growing spontaneously, or such of these as are planted, showing greater or less vigour of vegetation.

II.—It may be found that one formation is chiefly in herbage and another under the plough.

III.—If in herbage it may be observed whether the grass is used for breeding, dairy, or fatting purposes, and for what description and breed of stock.

IV.—The earliness of vegetation is a point in which a difference may be looked for.

V.—On ploughed land a different mode of cropping may be found to distinguish different geological tracts, whether as to the kinds of crops sown, or as to the succession in which they are raised.

VI.—The bulk of the yield.

VII.—The fineness of quality in the produce.

VIII.—The different degree of tenacity in the soil, and the mode in which it requires to be worked.

IX.—The mineral manures, as lime, in particular, which are established in a given district, and generally the efficiency and durability of all manures upon the soil of each formation.

X.—The disposition of the soil, if wet, to clear itself readily of water through artificial drains.

XI.—Its power of sustaining vegetation during long droughts.

XII.—The periods of sowing which experience has established in a given district.

XIII.—The thriving and health of stock, or their liability to peculiar diseases.

XIV.—The disposition of the ground to throw out the wheat in winter.

XV.—The exposure of the crops to the ravages of grubs or worms which feed on the roots of plants.

XVI.—The various quality of the water, and its consequent effect in floods or in artificial irrigation.

These are some of the heads on which observations that have been already made lead to the hope that further discoveries may result from closer investigation. It must not, however, be forgotten, that latitude, elevation, exposure, and aspect, exert more or less influence on the produce of the soil, and must be taken into account in extended surveys. Considerable difference may also be found between strata which are classed by geologists under the head of a single formation.

With regard to the mode of inquiry, the committee would suggest that it may be convenient in the first instance to examine several formations in contrast with each other, where those formations are found in considerable variety within a limited district, especially if a good geological map of such district already exists: when the leading characteristics of a formation in one neighbourhood have been thus ascertained, we may more easily inquire how far these are maintained uniformly by that formation throughout the whole of its range.

It will be a matter of practical interest to inquire what neighbouring strata afford materials for correcting, by the admixture of soils, the agricultural defects one of the other.

The committee beg to recommend that—an offer of the Yorkshire society to expend 100*l.* in an agricultural survey of the magnesian limestone in Yorkshire having been brought before this Society—50*l.* be added to that amount, provided the survey comprise the whole of that formation between Nottingham and South Shields, and a comparison be instituted with the parts of the contiguous formations which are immediately adjoining.

PH. PUSEY, Chairman.

The Yorkshire Society, in consequence of the shorter time which Mr. Phillips, their geological surveyor, who had been summoned elsewhere, was able to spare them, have been obliged to contract their original plan and postpone their survey.

Cambridge Meeting.

WEDNESDAY, JULY 15, 1840.

GENERAL REGULATIONS FOR EXHIBITION.

I. No stock can be admitted for exhibition unless the necessary certificates, in the form prescribed, and signed by the exhibitor in the manner directed, be delivered to the Secretary, or sent (post paid) so as to reach the Society's rooms, No. 5, Cavendish Square, on or before the 1st of July next.

II. The name and residence of the breeder of all animals exhibited, when known, should be stated.

III. Non-subscribers will be required to pay 5*s.* for every head or lot of live stock, before obtaining a ticket of permission to bring their cattle into the show-yard.

IV. The same animal cannot be entered for two classes, and in all cases the age of animals is to be computed from the day of birth.

V. No animal which won a first prize in any class at the meeting at Oxford will be allowed to compete for a similar premium at Cambridge.

VI. The sheep exhibited for any of the prizes must have been really and fairly shorn between the 1st of May and the 1st of July, 1840, both inclusive.

VII. Persons intending to exhibit extra stock must give notice to the Secretary on or before the 1 July next.

VIII. Any person who shall have been proved, to the satisfaction of the Council, to have been excluded from showing for prizes at the exhibition of any society, in consequence of having been convicted of an attempt to obtain a premium by giving a false certificate, shall not be allowed to compete for any of the prizes offered by the Royal Agricultural Society of England.

IX. In case any gentleman, or number of gentlemen, wish to offer a prize for any class of stock not specifically named in the prizes offered by the Society, he or they will be allowed to do so at the Cambridge Meeting, and the stock which shall compete for such prize shall be exhibited, subject to such conditions as shall be decided upon by the Council, and the prize awarded by such of the judges as the Council shall select. Animals exhibited for such prizes shall not be prevented from competing for any of the prizes offered by the Society for which they are qualified.

X. Stock of every description can only be admitted between the hours of eight in the morning and eight at night, on Monday, the 13th of July (with the exception of stallions, which must be in the yard at or before eight o'clock in the morning of the 14th of July), and must remain in the show-yard till the Wednesday afternoon following, at four o'clock, during which time no animal can be removed from its place, or

be taken out of the show-yard, without leave in writing from the Committee.

XI. Whenever reference is made to weights and measures, it is to be considered that the imperial weights and measures are alone referred to.

XII. Persons intending to exhibit seed wheat, implements, roots, seeds, &c., must give notice to the Secretary of the Society, in Cavendish Square, on or before the 1st of July; and furnish him with a description of them, and the probable space which will be required for them; and they may be brought to the show-yard either on Friday, the 10th, or Saturday, the 11th of July, between the hours of eight in the morning and six in the evening, in order that the Committee may be enabled properly to apportion the space allotted to the exhibition of those articles. The implements, &c., shall not be allowed to be removed from the show-yard until four o'clock on Wednesday, the 15th of July, without leave in writing from the Committee.

XIII. No premium will be given when the judges shall be of opinion that there is not sufficient merit in the stock, implements, &c., to justify the award, especially in those cases in which there is no competition.

XIV. All exhibitors for sweepstakes or extra prizes to be subject to the above regulations.

INSTRUCTIONS TO THE JUDGES.

As the object of the Society in giving the prizes for neat cattle, sheep, and pigs, is to promote improvement in breeding stock, the judges, in making their award, are requested not to take into their consideration the present value to the butcher of the animals exhibited, but to decide according to their relative merits for the purposes of breeding.

In Class V. the two first prizes are for horses adapted to farming purposes, and the judges are therefore requested, in addition to symmetry, to take activity as well as strength into their consideration, in awarding those two prizes.

CATTLE.

Prizes for Improving the Breed of Cattle.—1840.

Class I.—Short-Horns.

1. To the owner of the best Bull calved previously to the 1st of January, 1838	Thirty Sovereigns.
2. To the owner of the best Bull calved since the 1st of January, 1838, and more than one year old	Fifteen Sovereigns.
3. To the owner of the best Cow in milk . . .	Fifteen Sovereigns.
4. To the owner of the best in-calf Heifer, not exceeding three years old	Fifteen Sovereigns.
5. To the owner of the best Yearling Heifer . .	Ten Sovereigns.
6. To the owner of the best Bull Calf	Ten Sovereigns.

Class II.—Herefords.

1. To the owner of the best Bull calved previously to the 1st of January, 1838	Thirty Sovereigns.
2. To the owner of the best Bull calved since the 1st of January, 1838, and more than one year old	Fifteen Sovereigns.
3. To the owner of the best Cow in milk . . .	Fifteen Sovereigns.
4. To the owner of the best in-calf Heifer, not exceeding three years old	Fifteen Sovereigns.
5. To the owner of the best Yearling Heifer . .	Ten Sovereigns.
6. To the owner of the best Bull Calf	Ten Sovereigns.

Class III.—Devons.

1. To the owner of the best Bull calved previously to the 1st of January, 1838	Thirty Sovereigns
2. To the owner of the best Bull calved since the 1st of January, 1838, and more than one year old	Fifteen Sovereigns.
3. To the owner of the best Cow in milk . . .	Fifteen Sovereigns.
4. To the owner of the best in-calf Heifer, not exceeding three years old	Fifteen Sovereigns.
5. To the owner of the best Yearling Heifer . .	Ten Sovereigns.
6. To the owner of the best Bull Calf	Ten Sovereigns.

Class IV.—Cattle of any Breed, or Cross:

Not qualified for the foregoing Classes.

1. To the owner of the best Bull calved previously to the 1st of January, 1838	Thirty Sovereigns.
2. To the owner of the best Bull calved since the 1st of January, 1838, and more than one year old	Fifteen Sovereigns.
3. To the owner of the best Cow in milk . . .	Fifteen Sovereigns.
4. To the owner of the best in-calf Heifer, not exceeding three years old	Fifteen Sovereigns.
5. To the owner of the best Yearling Heifer . .	Ten Sovereigns.
6. To the owner or the best Bull Calf	Ten Sovereigns.

Class V.—Horses.

1. To the owner of the best Cart-Stallion . . .	Thirty Sovereigns.
2. To the owner of the best Cart-Mare and Foal .	Fifteen Sovereigns.
3. To the owner of the best Stallion for breeding hunters, carriage-horses, or roadsters, which shall have served mares during the season of 1840, at a price not exceeding 3*l*. each . .	Thirty Sovereigns.

SHEEP.

Prizes for Improving the Breeding of Sheep.—1840.

Class VI.—Leicesters.

1. To the owner of the best Shearling Ram . . Thirty Sovereigns.
   To the owner of the second-best ditto . . . Ten Sovereigns.
2. To the owner of the best Ram of any other age Thirty Sovereigns.
3. To the owner of the best pen of Five Ewes with their Lambs . . . . Ten Sovereigns.
4. To the owner of the best pen of Five Shearling Ewes . . . . Ten Sovereigns.

Class VII.—South Downs, or other Short-woolled Sheep.

1. To the owner of the best Shearling Ram . . Thirty Sovereigns.
   To the owner of the second-best ditto . . . Ten Sovereigns.
2. To the owner of the best Ram of any other age. Thirty Sovereigns.
3. To the owner of the best pen of Five Ewes with their Lambs . . . . Ten Sovereigns.
4. To the owner of the best pen of Five Shearling Ewes . . . . Ten Sovereigns.

Class VIII.—Long-woolled Sheep:

Not qualified to compete for Class VI.

1. To the owner of the best Shearling Ram . . Thirty Sovereigns.
   To the owner of the second-best ditto . . . Ten Sovereigns.
2. To the owner of the best Ram of any other age. Thirty Sovereigns.
3. To the owner of the best pen of Five Ewes with their Lambs . . . . Ten Sovereigns.
4. To the owner of the best pen of Five Shearling Ewes . . . . Ten Sovereigns.

Class IX.—Pigs.

1. To the owner of the best Boar . . . . . . Ten Sovereigns.
2. To the owner of the best Sow . . . . . . Five Sovereigns.
3. To the owner of the best pen of Three Pigs of the same litter, above four and under nine months old. . . . . Ten Sovereigns.

Class X.—Extra Stock, Implements, Roots, and Seeds.

For Extra Stock of any kind, not shown for any of the above Prizes, and for Implements, Roots, Seeds, &c., Prizes will be awarded and apportioned, by the Committee and Judges, to the value, in the whole, of. . . . . Fifty Sovereigns.

Gorse-crushing Machine.

Twenty Sovereigns, or a Piece of Plate of that value, will be given for the cheapest and most effective Gorse-crushing Machine.

1. The machine produced must be on a working scale, and at a cost that will be attainable by the occupiers of the smallest farms.
2. It must be capable of reducing the material to a pulpy state for the mastication of ruminating animals, as cows and sheep.

Any Implement.

For the Invention of any new Agricultural Implement, such sum as the Society may think proper to award.

Seed-Wheat.

I. Fifty Sovereigns, or a Piece of Plate of that value, will be given to the Exhibitor at the Cambridge Meeting of the best 14 bushels of White Wheat, of the harvest of 1839, and grown by himself.

II. Fifty Sovereigns, or a Piece of Plate of that value, will be given to the Exhibitor at the Cambridge Meeting of the best 14 bushels of Red Wheat, of the harvest of 1839, and grown by himself.

[12 bushels of the wheat will be sealed up by the judges, and one of the remaining bushels of each variety will be exhibited as a sample to the public. At the General Meeting in December, 1841, the prizes will be awarded.]

The two best samples of the wheat, without distinguishing between the two, will be selected by judges appointed at the Cambridge Meeting, and will be sown, under the direction of the Society, in the autumn of 1840, by three farmers, who will make their report, upon which the prize will be awarded. Ten sovereigns will be given to the exhibitor of one of these two samples who shall not obtain the prize; or if, from the produce when sown, neither of the two shall appear to deserve a prize, ten sovereigns will be given to the exhibitors of each.

FORMS OF CERTIFICATES.

The subjoined Forms of Certificates, adapted to the animals in each class, must be used by the Candidates intending to exhibit Cattle, Horses, Sheep, or Pigs, at the Cambridge Meeting in July, 1840; and must be delivered to the Secretary, on or before the 1st of July.

CATTLE.

For Bulls in Classes I., II., III., *and* IV.

I,   , of   , in the County of   , do hereby certify, that the Bull to be exhibited by me for the   Premium in Class   is of the   breed, will not be more than   years and   months old on the 15th of July, 1840, is my own property, and [if known] was bred by   of

Date   (Signed)

For Cows in Milk, in Classes I., II., III., *and* IV.

I, , of , in the County of , do hereby certify, that the Cow to be exhibited by me for the Third Premium in Class is of the breed, will not be more than years and months old on the 15th of July, 1840, had a live Calf on the day of last, is my own property, and [if known] was bred by of

Date (Signed)

For In-Calf Heifers in Classes I., II., III., *and* IV.

I, , of , in the County of , do hereby certify, that the Heifer to be exhibited by me for the Fourth Premium in Class is of the breed, will not be more than years and months old, on the 15th July, 1840, was bulled before the 10th of May, 1840, has not been bulling since that day, is my own property, and [if known] was bred by of

Date (Signed)

N.B. The Premiums for In-Calf Heifers will not be paid until they have calved.

For Yearling Heifers, in Classes I., II, III., *and* IV.

I, , of , in the County of , do hereby certify, that the Yearling Heifer to be exhibited by me for the Fifth Premium in Class is of the breed, will not be more than one year and months old on the 15th July, 1840, is my own property, and [if known] was bred by of

Date (Signed)

For Bull Calves in Classes I., II., III., *and* IV.

I, , of , in the County of , do hereby certify, that the Bull Calf to be exhibited by me for the Sixth Premium in Class is of the breed, will not be more than months old on the 15th July, 1840, is my own property, and [if known] was bred by of

Date (Signed)

N.B. It is desirable that the day when calved, if known, should be stated.

HORSES IN CLASS V.

For a Cart-Stallion.

I, , of , in the County of , do hereby certify that the Cart-Stallion to be exhibited by me for the First Premium in Class V. will not be more than years old on the 15th July, 1840, is my own property, [and if known] was bred by of

Date (Signed)

For a Cart-Mare and Foal, in Class V.

I of , in the County of , do hereby certify, that the Cart-Mare and Foal to be exhibited by me for the Second Premium in Class V. are my own property, that the Foal is the offspring of the Mare, and [if known] that the Mare was bred by of .

Date (Signed)

N.B. The name of the person to whom the Sire of the Foal belonged should, if known, be stated.

For Stallions for Breeding Hunters, Carriage-Horses, and Roadsters, in Class V.

I, , of in the County of , do hereby certify, that the Stallion to be exhibited by me for the Third Premium in Class V. has served Mares in the County or Counties of during the season of 1840, at a price not exceeding 3*l.* for each Mare, will not be more than years old on the 15th July, 1840, is my own property, and [if known] was bred by of

Date (Signed)

SHEEP.

For Shearling Rams, in Classes VI., VII., *and* VIII.

I, , of , in the County of , do hereby certify, that the Shearling Ram to be exhibited by me for the First Premium in Class is of the breed, will be less than two years old (namely, he will be months old) on the 1st July, 1840, was really and fairly shorn on the of (namely, between the 1st of May, and the 1st of July, 1840, both inclusive), is my own property, and [if known] was bred by of

Date (Signed)

For Rams of any age, in Classes VI., VII., *and* VIII.

I, , of , in the County of , do hereby certify that the Ram to be exhibited by me for the Second Prize in Class is of the breed, will not be more than years old on the 15th July, 1840, was really and fairly shorn on the of last, (namely, between the 1st of May, and the 1st of July, 1840, both inclusive,) is my own property, and [if known] was bred by of

Date (Signed)

For Ewes with their Lambs, in Classes VI., VII., *and* VIII.

I, , of , in the County of , do hereby certify, that the Pen of Five Ewes, with their Lambs, to be exhibited by me for the Third Premium in Class , are of the breed, and all of the same flock; that the Ewes were really and fairly shorn on the of (namely, between 1st of May, and the 1st of July, 1840, both inclusive); that the Lambs are the offspring of the Ewes respectively, the whole my own property, and [if known] the Ewes were bred by of

Date (Signed)

N.B.—It is desirable that the flock from which they are obtained should be stated if known.

For Shearling Ewes, in Classes VI., VII., *and* VIII.

I, , of , in the County of , do hereby certify, that the Pen of Five Shearling Ewes to be exhibited by me for the Fourth Premium in Class are of the breed, will be less than two years old (namely, will be months old) on the 15th of July, 1840, are all of the same flock, were really and fairly shorn on the of last, (namely, between the 1st of May and the 1st of July, 1840, both inclusive,) are my own property, and [if known] were bred by of

Date (Signed) .

PIGS in Class IX.

For a Boar.

I, , of , in the County of , do hereby certify, that the Boar to be exhibited by me for the First Premium in Class IX. will be years and months old on the 15th of July, 1840, is my own property, and [if known] was bred by of

Date (Signed)

For a Sow.

I, , of , in the County of , do hereby certify that the Sow to be exhibited by me for the Second Premium in Class IX., will be years months old on the 15th of July, 1840, is my own property, and [if known] was bred by of

Date (Signed)

For a Pen of Three Pigs.

I, , of , in the County of , do hereby certify that the Three Pigs to be exhibited by me for the Third Premium in Class IX. are all of one litter, will not be more than weeks old on the 15th of July, 1840, are my own property, and were bred by of

Date (Signed)

SEED-WHEAT CERTIFICATE.

I, , of , in the county of , do hereby certify, that the 14 bushels of Wheat to be exhibited by me were grown in the year 1839, on a soil, on the farm of , at , in the County of . The seed of which was obtained from Mr. , and was called

Date (Signed)

N.B. It would be desirable that any other particulars as to the preceding crop, the manner of sowing, and the quantity and sort of manure used, should be stated. This Certificate must be sent to the Secretary on or before the 1st of July, 1840.

A Sale by Auction, of Stock and other articles exhibited at the Meeting, will take place at the Show-yard on the morning of the 16th of July, at ten o'clock precisely, the Society paying the Auctioneer for his attendance on the occasion.

RICHMOND, President.

5, *Cavendish Square, London.*
May 13, 1840.

DONATIONS.

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Titles of Works.	*Donors.*
The Quarterly Journal of Agriculture: and the Prize Essays and Transactions of the Highland and Agricultural Society of Scotland. Nos. 48 and 49. 8vo. Edinb. 1840 .	The Highland Society.
General Statement of the Award of Premiums, Prize Reports, &c., of the Yorkshire Agricultural Society. No. 2 (for the year 1839). 8vo. Lond. 1840.	The Yorkshire Society.
Premiums, Rules, and Regulations of the East Suffolk Agricultural Association, for the year 1840. 8vo. Woodbridge. 1840.	The East Suffolk Association.
Address from the Superintending Committee of the Hampshire Agricultural Society to the owners and occupiers of land within the county. 4to. Winchester, Feb. 1840. (Sheet).	Sir Thomas Baring, Bart.
First and Second Annual Reports of the Harleston Farmers' Club. 12mo. Harleston. 1838-9.	The Harleston Farmers' Club.
The First Annual Report of the Watton Farmers' Club. 8vo. Watton, May 1840.	The Watton Farmers' Club.
Rules of the Isle of Thanet Farmers' Club. 4to. Ramsgate. (Sheet.)	The Thanet Farmers' Club.
Minutes of Proceedings (Nov. 1839); Classification of Cattle, Sheep, and Swine, along with the adjudication of Premiums at the Autumn Show of Breeding Stock; and the Premiums offered for the Spring Cattle Show of the Royal Dublin Society. 8vo Dublin. 1839. . . .	The Marquess of Downshire.
The Farmer's Magazine, and Monthly Journal of Proceedings affecting the Agricultural Interest; October 1839, to June 1840. 8vo. Lond. 1839-40.	William Shaw, Esq.
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The Philosophical Transactions of the Royal Society of London, from the commencement, in 1665, to the year 1800: abridged by Drs. Hutton, Shaw, and Pearson. 18 volumes 4to., bound in calf. Lond. 1809. . . .	Robert Adam Christopher, Esq. M.P.
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British Farmer's Annual Account Book and Almanac for 1840. By the Author of "British Husbandry." 4to. Lond. 1840.	FRENCH BURKE, ESQ.
Hints for the Use of Highland Tenants and Cottagers. By a Proprietor. 8vo. Inverness. 1838.	SIR FRANCIS A. MACKENZIE, BART.
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Recueil de Mémoires et d'Observations de Physique, de Météorologie, d'Agriculture, et d'Histoire Naturelle. Par le Baron L. A. d'Hombres-Firmas. 2 tomes. 8vo. Nismes. 1838.	THE AUTHOR.
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Mittheilungen aus der Generalversammlung deutscher Landwirthe in Potsdam, insbesondere Zusammenstellung der Verhandlungen der Abtheilung für Schaafzucht. Herausgegeben von M. Gumprecht. 8vo. Leipzig. 1839.	THE AUTHOR.

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Gordon, Robert, M.P. . . .	29, Dover-street .	Kemble Ho., near Cirencester, Glouc.
Grafton, Duke of	47, Clarges-street .	Euston Hall, Thetford, Norfolk
†Graham, Rt.Hon.SirJ.,Bt.FRS	46, Grosvenor-pl. .	Netherby, by Carlisle, Cumberland
Greathead, Edward . . .	8, Hind-st, Man.sq.	Uddings, nr. Ringwood, Hants.
Guest, SirJ.J., Bt., M.P., F.R.S.	13, Grosvenor-sq. .	Dowlais Ho., Merthyr-Tydvil, Glamrg.
Guise, Sir John W., Bart. .	. .	Rendcombe Park, Cirencester, Glouc.
Hale, Robert Blagden, M.P. .	15, Bolton-st. . .	Alderley Pk., nr Wootton, Tetbury, Gl.
Hall, Sir Benjamin, Bart. .	. .	Llanover, Monmouthshire
Hamond, Anthony . . .	. .	Westacre Hall, Rougham, Norfolk
†Handley, Henry, M.P. . .	30, Pall Mall . .	Culverthorpe Hall, Sleaford, Lincolnsh.
Handley, W. F.	. .	Newark-upon-Trent, Notts.
†Harcourt, George Simon, M.P.	Carlton Club . .	Ankerwycke House, Staines, Bucks.
Harland, Wm. Charles, M.P.	3, Chesterfield-st.	Sutton Hall, Easingwold, Yorks.
Hartopp, Sir Edmd. C., Bart.	169, New Bond-st.	Doe Bank, Sutton Colefield, Warw.
Hatherton, Lord	45, Grosvenor-pl. .	Teddesley Hall, Penkridge, Staffs.
Hayter, W. Goodenough, M.P.	11, Hyde Park ter.	Stoberry Park, Wells, Somerset.
Heathcoat, John, M.P. . .	6, Suffolk-street .	Bolham, Tiverton, Devon.
Heathcote, Gilbert J., M.P. .	Burlington Hotel	Stocken Hall, Stamford, Linc.
Heathcote, Sir W., Bart., M.P.	26, St. James's st.	Hursley Park, Winchester, Hants.
†Heneage, George Fieschi .	. . .	Hainton Hall, Wragby, Linc.
†Henniker, Lord, M.P. . . .	13, Gt.Stanhope-st	Thornham Hall, Suffolk
†Herbert, Hon. Sydney, M.P. .	1, Grafton-street .	Wilton House, Salisbury
Hervey, William	. .	Bradwell Grove, Burford, Oxon.
Hewett, W. H.		
†Hill, Sir Rowland Bart., M.P.	Limmer's Hotel .	Hawkstone Hall, Whitchurch, Salop.
Hippisley, Henry	. .	Lambourne Place, nr. Hungerford, Berks.
Hodges, Thomas Law, M.P. .	16, Suffolk-street .	Hempsted Park, Benenden, Kent
†Holford, R. S.	43, Grosvenor-sq.	Weston Birt House, Tetbury, Glouc.
Holland, Edward	. .	Dumbleton Hall, Evesham, Worc.
Hope, Henry Thomas, M.P. .	1, Mansfield-st. .	The Deepdene, Dorking, Surrey.
Houblon, John Archer . .	10, Cumberland-pl.	Hallingbury Pl, Bishop Stortford, Herts
†Howick, Viscount, M.P. . .	16, Whitehall-place	Howick House, Alnwick, Northumb.
Hulse, Sir Charles, Bart . .	. .	Breamore Ho., Fordingbridge, Hants.
†Hulse, Lieut.-Colonel . . .	. .	Breamore Ho., Fordingbridge, Hants.
Huntingfield, Lord . . .	. .	Heaveningham Hall, Yoxford, Suff.
†Huntingtower, Lord . . .	. .	Buckminster Park, Colsterworth, Linc.
Hurst, Robert Henry, M.P. .	68, St. James's-st.	Horsham, Sussex
Hyett, W. H.	. .	Painswick House, Stroud, Glouc.
†Ilchester, Earl of	31, Old Burlngtn-st	Melbury House, Sherborne, Dorset.
Johnstone, Sir John V. B., Bt.	27, Grosvenor-sq.	Hackness Hall, Scarborough, Yorkshire
Jones, Rev. J. P.	. .	Elm Green, Cirencester, Glouc.
Keene, Rev. Chas. Edmund .	. .	Swincombe House, Nettlebed, Oxon.
Kensington, Lord		

Governors.	Town Residence.	Country Residence.
Keppel, Frederick	. .	Lexham Hall, Swaffham, Norfolk
†Kerrison, Lt.Gen.Sir E., Bt. M.P.	13, Gt. Stanhope-st.	Oakley Park, Eye, Suffolk
Kenyon, Lord	9, Portman-square	Gredington Hall, Whitchurch, Flints.
Knatchbull, R.Hn.Sir E, Bt. MP	71, Lower Grosv.-st.	Mersham Hatch, Ashford, Kent
Labouchere, Rt. Hon. H., M.P.	27, Belgrave-sq. .	Stowey, Somersetshire
Lainson, Alderman John . .	59, Euston-square	
Langston, J. Haughton . .	143, Piccadilly .	Sarsden Ho., Chipping Norton, Oxon.
Lansdowne, Marquess of, F.R.S.	Berkeley-square .	Bowood Park, Calne, Wilts.
†Lawley, Sir Francis, Bart. .	18, Grosvenor-sq. .	Middleton Hall, Fazeley, Staffs.
†Lefevre, Rt.Hon.C. Shaw, MP.	Eaton-square . .	Heckfield Pl., Hartford Bridge, Hants.
Leigh, Lord	7, Park-crescent .	Stoneleigh Abbey, Kenilworth, Warw.
Lemon, Sir C., Bt. MP., F.R.S.	46, Chas-st. Brk-sq.	Carclew, Penryn, Cornwall
Ley, John Henry	4, Richmond-ter.	Trehill, Exeter
Liverpool, Earl of . . .	Whitehall . . .	Pitchford Hall, Shrewsbury, Salop
†Long, Walter, M.P. . . .	29, Hill-street .	Rood Ashton, Trowbridge, Wilts.
Lovelace, Earl of	10, St. James's-sq.	Ockham Park, Ripley, Surrey
Low, William	6, Norfolk-st, Strnd	
Macclesfield, Earl of, F.R.S. .	9, Conduit-street	Sherborne Castle, Tetsworth, Oxon.
Maitland, Eben. Fuller, F.R.S.	. .	Henley-on-Thames, Oxon.
Maitland, Wm. Whitaker .	. .	Loughton, Essex
Maclean, Donald, M.P. . .	24, Berkeley-sq.	King's Stanley Ho. Frocester. Dursley, Gl.
Melbourne, Viscount . . .	39, South-street	Brocket Hall, Welwyn, Herts.
†Miles, Philip J.	7, Hamilton-place	Leigh Court, Bristol
†Miles, William, M.P. . . .	Ditto	King's Weston, Bristol
†Mordaunt, Sir J., Bart., M.P. .	4, Eaton-place	Walton Hall, Stratford-on-Avon, Warw.
†Moreton, Lord	2, Seymour-place	Woodchester Park, Stroud, Glouc.
Morgan, Sir Chas. Gould, Bart.	70, Pall Mall	Tredegar, Newport, Monmouthshire
Morland, Thomas Thornhill .	102, Gloucester-pl.	Sheepstead, Abingdon, Berks.
†Morrison, James	57, Upp. Harley-st.	Fonthill Abbey, Hindon, Wilts.
Morton, John	. .	Chester Hill, Stroud, Glouc.
Moseley, John	. .	Glemham Ho., Saxmundham, Suffolk
Mostyn, Lord	9, Lwr Seymour-st.	Mostyn Hall, Holywell, Flintshire
Mostyn, Hon. Ed. M. Lloyd .	9, Gt. Seymour-st.	Mostyn Hall, Holywell, Flintshire
Naper, James Lennox Wm. .	. .	Lough Crew, Oldcastle, Ireland
†Neeld, Joseph, M.P. . . .	6, Grosvenor-sq. .	Grittleton House, Chippenham, Wilts.
Noel, Hon. Charles George .	11, Chandos-st, Cav.	Exton Park, Stamford, Linc.
Norfolk, Duke of, F.R.S. .	21, St. James's-sq.	Arundel Castle, Sussex
Normanby, Marquess of . .	Whitehall	Mulgrave Castle, Whitby, Yorkshire
Northampton, Marq. of, P.R.S.	145, Piccadilly .	Castle Ashby, Northampton
†Northumberland, Duke of, FRS.	Northumberlnd-ho.	Alnwick Castle, Northumberland
Nurse, Wm. Mountford . .	5, Langham-pl.	Great Cell Barns, St. Alban's
Page, William Woods . .	17, Wimpole-st.	
Palmer, Robert, M.P. . . .	6, Charles-street. .	Holme Park, Reading, Berks.
Patten, John Wilson, M.P. .	24, Hill-street. .	Bank Hall, Warrington, Lanc.
†Peel, Rt.Hon.Sir R., Bt., F.R.S.	Whitehall-gardens	Drayton Manor House, Fazeley, Staffs.
Pegus, Rev. P. M. . . .	. .	Uffington Hall, Stamford, Lincl.
†Pendarves, E.W., M.P., F.R.S.	36, Eaton-place .	Pendarves House, Truro, Cornwall
Penruddocke, Jno. Hungerford	35, Curzon-street	Compton Park, Salisbury, Wilts.
†Percival, John	. .	Northampton
†Perkins, Henry	. .	Hanworth Park, Hounslow, Middlesex
Philips, Mark, M.P. . . .	6, Vigo-street . .	The Park, Manchester
Plowden, William	. .	Plowden Hall, Bishop's Castle, Salop.

Governors.	Town Residence.	Country Residence.
†Popham, General	. .	Littlecot, Hungerford, Wilts.
†Portman, Lord	16, Grt. Cumb.-pl.	Bryanston House, Blandford, Dorset.
Price, Sir Robert, Bart., M.P.	11, Stratton-street	Foxley Hall, near Hereford
†Pusey, Philip, M.P., F.R.S. .	28, Lwr. Grosvr-st.	Pusey, Faringdon, Berkshire
Pym, Francis	35, Clarges-street	The Hasells, Biggleswade, Beds.
†Radnor, Earl of	52, Lwr Grosvr-st.	Longford Castle, Salisbury, Wilts.
Rayleigh, Lord	. .	Terling Place, Witham, Essex
Reid, George	8, Clarence-terrace	Woodmanstone, Ewell, Surrey.
†Richmond, Duke of, F.R.S. .	51, Portland-place	Goodwood Park, Chichester, Sussex
Ripon, Earl of, F.R.S. . . .	1, Carlton Gardens	Nocton Hall, Lincoln
Rodd, Rev. Edward, D.D. .	. .	Trebartha Hall, Launceston, Cornwall
Rogerson, Joseph	24, Norf.-st. Strand	
Rosebery, Earl of, F.R.S. .	139, Piccadilly .	Warren Wood, Hatfield, Hertfordshire
†Rutland, Duke of	7, Bolton-street .	Belvoir Castle, Grantham, Lincolnshire
Salisbury, Marquess of . .	20, Arlington-st. .	Hatfield House, Herts.
†Sanford, Ed. A., M.P., F.R.S.	21, Queen-st, Mayfr	Nynehead Court, Wellington, Somerset.
Scarborough, Earl of . . .	41, South-st. . .	Sandbeck Castle, Bawtry, Yorkshire
Seymour, Henry	39, Upp. Grosvr.-st	Knoyle House, Hindon, Wilts.
Shaw, William	7, King's-rd, Bdf-rw	
Sherborne, Lord	17, Hyde Park-st.	Sherborne House, Northleach, Glouc.
Sheridan, Richard Brinsley .	9, Grosvenor-sq. .	Frampton House, Dorchester, Dorset.
Shuckburgh, Sir F., Bart. FRS.	Hans-pl., Chelsea	Shuckburgh Park, Southam, Warwicksh.
†Slaney, Robt. Aglionby, M.P..	17, Suffolk-street	Walford Manor, Shrewsbury, Salop.
Smith, Jeremiah	. .	Cadbero, Rye, Sussex
†Smith, John Abel, M.P. . .	47, Belgrave-sq.	Sacombe Park, Ware, Herts.
Smith, William	. .	Prae Mill, St. Albans, Herts
†Sondes, Lord	17, St. James's-pl.	Elmham Hall, Elmham, Norfolk
†Spencer, Earl	27, St. James's-pl.	Althorp Park, near Northampton
Stanhope, John Spencer . .	. .	Cannon Hall, Barnsley, Yorkshire
†Stanley, Lord, M.P. . . .	8, St. James's-sq. .	Knowsley Hall, Prescot, Lancashire
Stansfield, Wm. R. C., M.P.	11, Clarges-street .	Esholt Hall, Bradford, Yorkshire
Stracey, Sir Edw. Bart., F.R.S.	. .	Rackheath Hall, Norwich
†Stradbroke, Earl of . . .	18, Queen-street .	Henham Park, Wangford, Suffolk
†Strutt, Edward, M.P. . . .	42, South-street .	St. Helen's, near Derby
Stuckey, Vincent	126, Sloane-street	Hill House, Langport, Somersetshire
†Sutherland, Duke of . . .	Stafford House .	Trentham Park, Newcastle-under-Lyne
†Sutton, Sir Richard, Bart. .	. .	Norwood Park, Southwell, Notts.
†Talbot, Earl, F.R.S. . . .	33, Gt. George-st.	Ingestre Hall, near Stafford
Thomas, Inigo	. .	Ratton Park, Eastbourne, Sussex
†Thorold, Sir John Chas., Bart.	. .	Syston Park, Grantham, Lincolnshire
Tower, Christopher Thomas .	. .	Weald Hall, Brentwood, Essex
†Townley, Rich. Greaves, M.P.	Limmer's Hotel .	Fulbourn House, near Cambridge
Tremayne, John Hearle . .	. .	Heligan, Grampound, Cornwall
Trotter, John	. .	Horton Place, near Epsom, Surrey
Vansittart, Henry	. .	Kirkleatham, Guisborough, Yorkshire
Vavasour, Hon. Sir E. M., Bart.	. .	Haslewood Hall, Tadcaster, Yorkshire
Villebois, Frederick . . .	. .	Benham Place, Newbury, Berks.
†Wakeman, Sir Offley P., Bart.	3, Princ.-st, Han-sq	Perdiswell Park, Worcester
Wall, Ch. Baring, M.P., F.R.S.	44, Berkeley-sq. .	Normanton Court, Stockbridge, Hants.
Watson, Hon. Richard . .	36, Davies-street .	Rockingham Castle, Northampton.

Governors.	Town Residence.	Country Residences.
Welby, Sir Wm. Earle, Bart.	8, Upp. Belgrave-st.	Denton House, Grantham, Lincolnshire
†Wellington, Duke of . . .	Apsley House . .	Strathfieldsaye, Hartford-bridge, Hants
†Wenlock, Lord	29, Berkeley-sq. .	Escrick Hall, Selby, Yorkshire
†Westminster, Marquess of .	33, Upp. Grosv.-st.	Eaton Hall, Chester
†Whitbread, William Henry .	76, Eaton-square .	South Hill House, near Bedford
Wilbraham. G., M.P., F.R.S.	23, Brook-street .	Delamere House, Northwich, Cheshire
Williams, William, M.P. . .	31, Pall-Mall	
Williams, Rev. E. H. G. . .	. .	Marlborough, Wilts.
Wilmot, Edward Woollet . .	. .	Worksop Manor, Nottinghamshire
Wills, Benjamin	. .	Camberwell, Surrey
†Wilson, Henry	. .	Stowlangtoft Hall, Ixworth, Suffolk
Wilshere, William, M.P. . .	2, I, Albany . .	Hitchin, Hertfordshire
Wingate, W. B.	.	Hareby, Bolingbroke, Lincolnshire
Wood, Col. Thomas, M.P. .	4, Cavendish-sq. .	Littleton House, Staines, Middlesex
†Worsley, Lord, M.P. . . .	12.Up. Belgrave-st.	Manby Hall, Glanford Bridge, Linc.
Wright, John	6, Henrietta-st. C G	Belsize Park, Hampstead, Middlesex.
Wroughton, Bartholomew .	. .	Woolley Park, Wantage, Berks.
Wyndham, Colonel George .	4, Grosvenor-place	Petworth House, Sussex
†Yarborough, Earl of . . .	17, Arlington-st. .	Brocklesby Hall, Glanford Bridge, Linc.
†Yorke, H. R.	. .	Syston Park, Grantham, Linc.
Youatt, William	1, Osnab-pl, Nw-rd	

LIST OF MEMBERS.

[LIFE-MEMBERS are distinguished by a mark thus †.]

Members.	Town Residence.	Country Residence.
Abbey, George	. .	Silsworth, Watford, Daventry, Northmp.
Abbott, Thomas	. .	Aylesford, Kent
Ackland, Robert Innes	. .	Boulston, Haverfordwest, Pembroksh.
Acland, Thomas Dyke, M.P.	92, Jermyn-street	Holnicote, Minehead, Somersetshire
Acome, John	. .	Kidlington, Woodstock, Oxon.
Adams, John	. .	Holyland, near Pembroke
Adams, John	. .	Newark, Nottinghamshire
Adcock, William	. .	Farmdish, nr. Wellingborough, Northn.
Ade, Rev. John	. .	Wensley Rectory, Bedale, Yorkshire
Adey, William	. .	Chorley, Lichfield, Staffs.
Agar, Hon. G. C.	. .	Woodstock, Oxon.
Aitken, J.	. .	Deeping Fen, Spalding, Lincolnshire
Alderman, Charles	. .	Kentbury, Newbury, Berks.
Aldridge, Robert	. .	St. Leonard's Forest, Horsham, Sussex
Aldworth, J.	. .	Frilford, Abingdon, Berks.
Aldworth, W., Jun.	. .	Frilford, Abingdon, Berks.
Alexander, Wm. Maxwell	22, Upp. Grosv.-st.	Southbar, Renfrewshire
Allen, W.	. .	Great Hendred, Wantage, Berks.
Allin, Richard	. .	Little Moor, Oxford
Allin, Richard, Jun.	. .	Sandford, Oxford
Allington, Rev. J.	. .	Little Barford, Beds.
Allix, Charles	. .	Willoughby Hall, Grantham, Lincolns.
Allpress, R. W.	. .	Burleigh Hill, St. Ives, Huntingdonshire
Allright, Nicholas	. .	Charlbury, Enstone, Oxon.
Almack, John, Jun.	. .	Leckonfield Park, Beverley, Yorkshire
Almack, Thomas	. .	Bishop Burton, Beverley
Almack, Barugh	10, Whitehall-pl.	
Alywin, William	. .	Thatcham, Newbury, Berks.
Ambrose, John	. .	Copford, Colchester, Essex
Anderson, Robert	. .	Cirencester, Gloucestershire
Anderson, Walter	. .	Oakley, Bedford
Anderson, Wm.	. .	Long Sutton, Wisbeach, Cambridgesh.
Andrews, Benjamin	. .	Chartham, Canterbury, Kent
Andrews, Edwin	. .	Shroton, Blandford, Dorsetshire
Andrews, Michael	. .	Ardoyne, near Belfast
Annesley, Arthur	89, Eaton-square	Bletchington Park, Woodstock, Oxon.
Annesley, Rev. Charles	. .	Eydon, near Daventry, Northamp.
Ansell, William	. .	Wantage, Berks.
Arbuthnot, Rt. Hon. Charles	. .	Woodford Lodge, Kettering
†Archbold, Robert, M.P.	55, Jermyn-street	David's Town, Castledermot, Ireland
Archer, T.	. .	Ely, Cambridgeshire
Archer, William	. .	Horningsham, Warminster, Wilts.
Arckoll, W.	. .	Langley, West Ham, Sussex
Arkwright, Charles	68, Portland-place	Dunstall Lodge, Burton-on-Trent, Staff.
Arkwright, Rev. Joseph	. .	Mark Hall, Harlow, Essex
Arkwright, Robert	. .	Sutton Hall, Chesterfield, Derbyshire
Arnatt, Jonathan	. .	Leer, Witney, Oxon.

Members.	Town Residence.	Country Residence.
Arnitt, G.		
Arnot, David Gale	. .	Wyfold Court, Henley-upon-Thames
Arnott, George	. .	Tingewick, Buckingham
Ashdown, John M.	. .	Uppington, Shrewsbury, Salop.
Ashhurst, William Henry	. .	Waterstock House, Wheatley, Oxon.
Ashhurst, W. H., Jun.	. .	Waterstock House, Wheatley, Oxon.
Ashmore, Joseph	. .	Norland, near Evesham, Worc.
Ashwin, James	. .	Bretforton, near Evesham, Worc.
Ashwin, Thomas	. .	Tower Hill, Bidford, Warwickshire
†Astbury, William	62, High-st, Cam. T	
Aston, Samuel	. .	Compton House, Newent, Gloucestersh.
Atkins, E. Martin	. .	Kingston-Lisle, Wantage, Berks.
†Atkinson, William James	. .	Marlow, Buckinghamshire
Atterbury, H. S.	. .	Woburn, Bedfordshire
Austin, L. S.	. .	The Warren, Wootton-under-Edge
Aylmer, Robert	. .	Fincham Hall, Fincham, Norfolk
Ayres, Robert	. .	Girtford, Biggleswade, Beds.
Bacon, James	. .	Pluckley, Charing, Kent
Badcock, Benjamin	. .	Broad-street, Oxford
Badcock, John	. .	Radley, Abingdon, Berks.
Baden, Andrew	. .	Longstreet, Pewsey, Wilts.
Badham, G. D.	. .	Waldringfield, Woodbridge, Suffolk
Bailey, C.	. .	6, Berkeley place, Cheltenham
Bailey, Charles	. .	Abingdon, Berks.
Bailey, William James	. .	Shenley House, Stony Stratford, Bucks
Bailey, J.	. .	Shirley House, Stony Stratford, Bucks.
Bailey, William	. .	Hursley, Winchester, Hants.
Baillie, William Hunter	33, Cavendish-sq.	Duntisbourne, Cirencester, Gloucestersh.
Bailward, John	. .	Horsington, Wincanton, Somersetshire
Baines, John	8, Cleveland-row .	Goosnargh, Preston, Lancashire
Baines, John Fuller	. .	Stisted, near Braintree, Essex
Baker, Robert	. .	Writtle, Chelmsford, Essex
Baker, Richard W.	. .	Cottesmore, Oakham, Rutlandshire
Baker, Sir Edw. Baker, Bart.	. .	Ranston House, Blandford, Dorset.
Baker, T. Barwick	. .	Hardwick Court, Gloucester
Baker, Rev. Richard Henry	. .	Linchmere, Hazlemere, Sussex
Baker, Thomas	. .	Little-Rollright, Chipping-Norton, Oxon
Baldwin, W. T.	. .	Steed Hill, Harrietsham, Kent
Baldwyn, Stephen	. .	Ashton-Underhill, Gloucestershire
Ball, Edward	. .	Burwell, Cambridgeshire
Ballard, Rev. J.	. .	Cropredy, Banbury, Oxon.
Banks, Rev. S. Horatio	. .	Dullingham, Newmarket
Bannerman, A.	. .	Chorley, Lancaster
Bannister, S.	. .	Weston Pembridge, Herts.
Banting, James	. .	Oxford
Barber, Richard	. .	Charlton, Tetbury, Gloucestershire
Barclay, Donald	. .	Mayfield, Sussex
Barclay, William	. .	Haseley, near Warwick
Barclay, James Pringle	. .	Wickham Market, East Suffolk
Barker, Rev. B.	. .	Shipdham Rectory, Norfolk
Barker, Field Dunn	. .	Cambridge
Barker, George Raymond	. .	Fairford Park, Fairford, Gloucestersh.
Barlow, Rev. G. F.	. .	Burgh, Woodbridge, Suffolk
Barnard, Edward George, M.P.	. .	Gosfield Hall, Essex
Barnard, F.	. .	Wantage, Berks.
Barnard, Richard	. .	Pusey, near Faringdon, Berks.
†Barneby, William	. .	Chater Park, Bromyard, Herefordshire
Barnett, Charles	. .	Stratton Park, Biggleswade, Beds.

Members.	Town Residence.	Country Residence.
Barnett, Joseph	. .	Remenham Hill, Henley-on-Thames
Barrett, Thomas	. .	Tatsfield Court, Westerham, Kent
Barrington, Viscount, M.P. .	. .	Beckett House, Faringdon, Berks.
Barry, Thomas	. .	Middle Claydon, Winslow, Bucks.
Barter, Rev. C.	. .	Sarsden, Chipping-Norton, Oxon.
Barthropp, Nathaniel . . .	. .	Cretingham, near Framlingham, Suffolk
Bartlett, William	. .	Whatcombe, Blandford, Dorset.
Bartlett, Isaac	. .	Haws, Brackley, Northamptonshire
Bartlett. John	. .	Haws, Brackley, Northamptonshire
Bartlett, William	. .	Great Bedwin, Wiltshire
Barton, Thomas	. .	Threxton, Watton, Norfolk
Barton, John	. .	Lee, Havant, Hampshire
Barton, Nathaniel . . .	. .	Corsley House, Warminster, Wilts.
Barugh, William	. .	Beeford, Bridlington, Yorkshire
Bateman, Henry	. .	Rickmansworth, Herts.
Bateman, Thomas . . .	50, Lincoln's Inn F.	Guilsborough, Northamptonshire
Bates, Thomas	. .	Kirkleavington, Yarm, Yorks.
Bates, Thomas Ellis . . .	. .	Fittleton, Amesbury, Wilts.
Bathurst, Earl	8, John-st, Berk-sq	Oakley Park, Cirencester, Glouc.
Bathurst, Hon. William L. .	7, Half-moon-st.	
Batley, John		
Batt, E. A.	. .	Witney, Oxfordshire
Batt, William	. .	West Drayton, Middlesex
Bawldry, Charles	. .	Hasketon, Woodbridge, Suffolk
Bawtree, John	. .	Abberton, near Colchester, Essex
Baxter, Robert	. .	Doncaster, Yorkshire
Bayley, C. B.		
Bayne, Dr.	. .	Cambridge
Bayne, William	. .	High-street, Oxford
Beach, Sir Mich. Hicks, Bart.	20, Portman-sq.	Williamstrip Park, Fairford, Gloucest.
Beach, John	. .	Redmarley, Stroud, Gloucester.
Beadel, James	. .	Witham, Essex
Beales, Charles	. .	Shelford, Cambridgeshire
Beales, Patrick	. .	Cambridge
Beard, Rev. James . . .	. .	Cranfield Rectory, Newport-Pag., Bucks.
Beart, Robert	. .	Godmanchester, Huntingdonshire
Beasley, John	. .	Brampton, Northamptonshire
Beasley, T. Calvert . . .	. .	Harston, Grantham, Lincolnshire
Beasley, W.	. .	Welland Cottage, Spalding, Linc.
Beaufort, Henry	. .	Holme, Biggleswade, Bedfordshire
Beaumont, E. B.	. .	Firmingley, Bawtry, Nottinghamshire
Beck, William	. .	Mileham, East Dereham, Norfolk
Beck, Edward	. .	Harpley, Castle Rising, Norfolk
Beckett, W.	. .	Kirkstall Grange, Leeds, Yorkshire
Beckford, William . . .	36, Finsbury circus	
Bedford, John	. .	Boughton House, Lincolnshire
Beldam, Valentine	. .	Royston, Hertfordshire
Bell, J. G.	. .	Cambridge
Bell, William	30, Bucklersbury	
Belliss, W.	. .	Burlington, Shiffnal, Salop.
Beman, Robert	. .	Donnington, Stow-on-the-Wold, Glouc.
Bennell, Joseph	. .	Hitchin, Herts.
Bennet, James Thomas . .	. .	Cheveley, Newmarket
Bennett, James	. .	Cadbury House, Castle Carey, Somers.
Bennett, Joseph	. .	Tempsford, Biggleswade, Beds.
Bennett, P.	. .	Rougham Hall, Bury St. Edmund's
Bennett, Samuel	. .	Bickerings Park, Woburn, Beds.
Bennett, Thomas	. .	Woburn, Beds.
Bennett, Thomas	. .	Chaddlesworth, Wantage, Berks.
Bennett, William	. .	Lewsey, near Luton, Beds.

Members.	Town Residence.	Country Residence.
Bennett, W.	. .	Syde, Cirencester, Gloucestershire
†Benson, Rev. Henry B. . .	. .	Utterby House, Louth, Lincoln.
Benson, John	. .	Tavistock, Devon.
†Bentinck, Lord George . .	19, Cavendish squ.	
Bentley, J. W.	. .	Clay Bridge, near Lincoln
Bentley, Thomas	. .	Hermitage, Rochester, Kent
Benyon, Rev. E. R.	. .	Culford, Bury St. Edmund's
Best, Rev. T.	. .	Kirby-on-Bain, Horncastle, Lincoln.
Bethell, Henry	. .	Enford, Pewsey, Wilts.
Bethune, Edward Drinkwater	80, Chester-square	
Bethune, Rev. G.	. .	Worth Rectory, Crawley, Cuckfield, Sus.
Bethune, John Drinkwater .	. .	Thorncroft, Leatherhead, Surrey
Bettridge, Henry	. .	East Hanney, Abingdon, Berks.
Bettridge, R. H.	. .	Milton Hill, Abingdon, Berks.
Betts, William	. .	Church Farm, Stow Bardolph, Norfolk
Bicheno, Jas. Ebenezer, F.R.S.	. .	Tymaen, Pyle, Glamorganshire
Bidwell, James	. .	Hockham, near Larlingford, Norfolk
Bigg, Thomas	15, Crawfd.-st.M'bn	
Binns, Jonathan	. .	Lancaster
Birch, George W.	. .	Roxholme, near Sleaford, Lincolnshire
Bird, John	. .	Shouldham Abbey, Shouldham, Norfolk
Birks, John		
Birnie, John Richard . . .	8, St. Martin's-pl.	Euston Farm, near Bagshot
Birt, Jacob	12, Myddleton-sq.	
Bisshopp, John	. .	Westburton, Petworth, Sussex
Blackbourn, David	. .	Temple Brewer, Lincolnshire
Blackett, Henry	16, Portman-street	Sockburn, Darlington, Durham
Blackford, Richard	. .	Malmesbury, Wilts.
Blackstone, J.	. .	Camden Terrace
Blagrove, Edward	. .	Magdalen College, Oxford
†Blair, John	18, Calthorpe-st.	Moseley Lodge, Welford
Blake, Nathaniel	. .	Stanton-Harcourt, Ensham, Oxon.
Blakesley, Rev. Jos. W., M.A.	. .	Trinity College, Cambridge
Blanch, Gustavus William .	Storey's Gate	
Bland, Thomas, M.D. . . .	. .	Melton, Woodbridge, Suffolk
Bland, William	. .	Hartlip, Sittingbourne, Kent
Blandy, Adam	. .	Kingston House, Abingdon, Berks.
Blandy, T.	. .	Kingston, Bagpuze, Abingdon, Berks.
Blexam W.	. .	Moditonham, Devonport
†Bliss, Rev. Philip, D.D. . .	. .	Oxford
Blunt, Edward Walter . .	. .	Kempshott Park, Basingstoke, Hants.
Blunt, F Scawen	. .	Crabbet Park, Crawley, Sussex
Blurton, William	. .	Field Hall, Uttoxeter, Staffordshire
Blyth, H. E.	. .	Burnham-Westgate, Norfolk
Boards, William	. .	Edmonton, Middlesex
Boby, Charles	. .	Finborough, Stowmarket, Suffolk
Bodger, R.	. .	Southill, Biggleswade, Beds.
Bodley, John	. .	Stockleigh, Crediton, Devon.
Boger, Deeble	. .	Plympton, Devonshire
Bolton, Lord	25, Berkeley-sq.	Hackwood Park, Basingstoke, Hants.
Booth, John	. .	Killerby, Catterick, Yorkshire
Bosanquet, G J.	. .	Broxbournbury, Hoddesden, Herts.
†Botfield, Beriah	. .	Norton Hall, Daventry, Northamptonsh.
Botfield, Thomas	. .	Hopton Court, Cleobury-Mortimer, Salp.
Botfield, William	. .	Decken Hill, Shiffnal, Salop.
Botley, John	. .	Stockleigh, Crediton, Devon.
†Bourchier, Charles . . .	66, Wimpole-street	
Bourne, George	. .	Halton, Spilsby, Lincolnshire
Bouverie, Edward	. .	Delapre Abbey, Northampton
Bouverie, Hon. P. Pleydell .	16, Hill-st Bkly-sq	Brymore, Bridgewater

Members.	Town Residence.	Country Residence.
Bowker. T.	. .	Whittlesea, Cambridgeshire
Bowly, David	. .	Cirencester, Gloucestershire
Bowly, Edward	. .	Siddington, near Cirencester, Gloucesh.
Bowly, William	. .	Cirencester, Gloucestershire
Bowman, Charles	. .	Greatford, Market Deeping, Northamp.
Bown, Joseph	. .	Pamphill, Wimborne. Dorset.
Boyles, Rev. C. G.	. .	Buriton, Petersfield, Hampshire
Boys, Henry	. .	Waldersbare, Dover, Kent
Boys, Rev. J.	. .	Cranbrook, Kent
Boys, R.	. .	Eastbourne, Sussex
Boys, Edward	. .	Alkerton, Banbury, Oxon.
Brackenbury, John.	. .	Thorpe Hall, Shouldham Thorpe, Norf.
Bradford, Edward	. .	Beaconsfield, Bucks.
Bradley, Edward	. .	Traduff, Cowbridge, Glamorganshire
Braginton, George	. .	Torrington, Devon.
Brailsford, Thomas	. .	Barkwith, Wragby, Lincolnshire
Braine, Robert	. .	Oxford
Braithwaite, Garnet	. .	Plumtree Hall, Milnthorpe, Westmorld.
Brand, Thomas	. .	The Hoo, Welwyn, Herts.
Brenner, W.		
Bretingham, T. C.	. .	Brockdish, Harleston, Norfolk
Brettell, Richard	. .	Finstall, Bromsgrove, Worcestershire
Brewitt, Thomas	. .	Rayleigh, Essex
Breynton, John	. .	Haunch Hall, Lichfield, Staffordshire
Bridge, Thomas	. .	Buttsbury, Ingatestone, Essex
†Bright, J.	. .	Teddesley Pk. Farm, Penkridge, Staffs.
Bristow, S. E.	. .	Burthorp House, Newark, Notts.
Broadwood, J. S.	. .	Lyne, Dorking, Surrey
Brockman, Frederick	. .	Underhill, Hythe, Kent
Brockman, Rev. W.	. .	Beachborough, Hythe, Kent
Bromhead, Benjamin . . .	. .	Lincoln
Bromley, R. Madox	Colonial Club	
Bromwell, Rev. R.	. .	Pembroke College, Oxford
†Brooke, Sir Richard, Bart. .	. .	Norton Priory, Runcorn, Cheshire
Brooker, Pitman	. .	Paul's Craig, Dartford, Kent
Brookes, John	. .	Burton, Much-Wenlock, Salop.
Brookes, Thomas	. .	Croxby, near Caistor, Lincolnshire
Brooks, John	. .	Hatford, Faringdon, Berkshire
Brooks, Bernard	. .	Lyford, Abingdon, Berkshire
Brown, Charles	. .	Redbourn, St. Alban's, Hertfordshire
Brown, C. E.	. .	Chronicle Office, Cambridge
Brown, Davies	. .	Markham Hall, Shouldham, Norfolk
Brown, Francis	. .	Welbourne, Sleaford, Lincolnshire
Brown, George	. .	Avebury, Marlborough, Wiltshire
Brown, George	. .	Kingsley Cottage, Alton, Hants.
Brown, George	. .	Avebury, Marlborough, Wiltshire
†Brown, Rev. H.	. .	Burton, Sleaford, Lincolnshire
Brown, J. Boak	. .	Boyton Court Farm, Kent
Brown, James	. .	Colne Engain, near Halstead, Essex
Brown, John	. .	Compton, Ibsley, Ringwood, Hants.
Brown, Joseph	. .	Church Farm, Wimbotsham, Norfolk
Brown, Potto	. .	Houghton, near St. Ives, Hunts.
Brown, Rev. Robert	. .	Kidlington, Wood tock, Oxon.
Brown, T.		
Brown, Thomas	. .	Bartenbury Ho., Cirencester, Glouces.
Brown, Thomas	. .	South Fairly, Wantage, Berkshire
Brown, William	. .	Tring, Hertfordshire
Browne, John	11, O. Cavendish-st	Chisledon, Marlborough, Wiltshire
Browne, Rev. Robert		
Browne, W. R.	. .	Chisledon, Marlborough, Wiltshire

Members.	Town Residence.	Country Residence.
Browning, Jonathan	. .	Oxford
Bruges, Wm. Heald, M.P.	3, Suffolk-street	Seend, Melksham, Wilts.
Brunner, William	. .	Oxford
Bryant, Joshua	. .	Melton, near Woodbridge, Suffolk
Bryant, William	. .	Newmarket, Cambridgeshire
Bryne, Rev. A.	. .	Boldre Hill, near Leamington, Warw.
Bubb, Anthony	. .	Whitcombe, Gloucestershire
Buchan, James.	. .	Franch, near Kidderminster, Worcest.
Brice, Richard	. .	Bridge Place, Canterbury, Kent
Buckley, John	. .	Normanton Hill, Loughborough, Leic.
Budd, Captain H., R. N.	. .	Winterbourne-Zelston, Marlbro', Wilts.
Bulford, Thomas	. .	Studley, Oxford
†Buller, John	. .	Morsal, Looe, Cornwall
†Bullock, Ferdinand	. .	East Challow, Wantage, Berkshire
Bulwer, William Lytton	. .	Heydon Hall, Reepham, Norfolk
Bunnett, Thomas		
Burd, Timotheus	. .	Whiston Priory, Salop.
Burden, D.	. .	Abingdon, Berkshire
Burford, Thomas		
Burgess, Robert	. .	Winterborne Bassett, Blandford, Dors.
Burgoyne, Sir J., Bart.	. .	Sutton Park, Biggleswade, Beds.
Burke, J. French	10, Gt. James-st, B.r	
Burke, St. George	25, Parliament-st.	
Burman, William	. .	Stratford-on-Avon, Warwickshire
Burn, Ilderton	21, Connaught-sq.	
Burnand, William	. .	Aldingbourne, Chichester, Sussex
Burness, C.	. .	Woburn Abbey, Bedfordshire
Burroughes, H. Negus, M.P.	. .	Burlingham Hall, Norwich
Burrows, T., Jun.	. .	Headdington, near Oxford
Burt, Thomas	. .	Iwerne, Blandford, Dorsetshire
Burt, William	. .	Witchampton, Wimborne, Dorset.
Burt, Ainé		Witchampton, Wimborne, Dorset.
Burt, George	. .	Witchbury, Wiltshire
Burton, Launcelot Archer	. .	Grove End House, St. John's Wood
Burtt, James	. .	Clenston, Blandford, Dorset.
Bury, John W.	20, Devon.-st, Pt.-pl	
Bush, John	. .	Park Farm, Stow Bardolph, Norfolk
Butcher, Moses	. .	Steeple Ashton, Devizes, Wilts.
Butcher, W.	. .	Standish, Stroud, Gloucestershire
Butler, John	. .	Kirby Ho., Inkpen, Hungerford, Berks.
Butler, Thomas, jun.	. .	Hatfield-Peveril, Essex
Butterfield, Charles Cotton	. .	Petersfield, Hampshire
†Butterfield, John	. .	Hawes, Brackley, Northamptonshire
Cadle, Joseph	. .	Westbury-on-Severn, Gloucestershire
†Calcraft, John Hales, M.P.	12, Carlton-terrace	Corfe Castle, Dorset.
†Caldecott, Thomas	. .	Rugby Lodge, Rugby, Warwickshire
Caldecote, R. M.	. .	Eastbourne, Sussex
Caldwell, Stamford	University Club	Linley Wood, Newcastle, Staffordshire
Caley, Digby	. .	Ripon, Yorkshire
Calhoun, Walter F.	. .	Binderton, near Chichester, Sussex
Callum, Joseph	. .	Pattingham, Wolverhampton, Staffs.
Calthorp, Richard	. .	Swinehead Abbey, Boston, Lincolnshire
Calverley, Thomas	1, Regent-street	Ewell House, Ewell, Surrey
Calvert, Edmund	. .	Hunsdon, Ware, Herts.
Calvert, Colonel Felix	. .	Hunsdon House, Ware, Herts.
†Calvert, Frederick	6, St. James's Pla.	
Calvert, John W., M.D.	11, Blandf.-pl. R.P.	
Calvert, N.	. .	Hunsdon, Ware, Herts.

Members.	Town Residence.	Country Residence.
Campion, Edward . . .	. .	Melchbourne, Beds.
Cannon, J. S.	. .	Beckley, Oxford
Capel, William	. .	Grove, Stroud, Gloucestershire
Capper, Mrs.	. .	Hailsham House, Hailsham, Sussex
†Carew, W. H. Pole . . .	. .	Antony House, Devonport, Devon.
Carlisle, The Lord Bishop of .	15, Grosvenor-street	Rose Castle, Wigton, Cumberland
Carnarvon, Earl of . . .	. .	Highclere House, Newbury, Berks.
Carrington, Lord	. .	The Abbey, High Wycombe, Bucks.
Carrington, Geo., Jun. . .	. .	The Abbey, Great Missenden, Bucks.
†Carter, John Bonham . . .	. .	Ditcham Grove, Petersfield, Hants.
Carter, J. Thomas . . .	. .	Hunstanton, Lynn, Norfolk
Carter, J. R.	. .	Spalding, Lincolnshire
Carter, W.	. .	Quantock Farm, near Taunton, Som.
†Cartwright, Thomas W. . .	. .	Ragnall Hall, Newton, Newark, Notts.
Carver, W. Coole	. .	Melbourn, Cambridgeshire
Cary, Rev. H.	. .	Cowley House, near Oxford
Casson, J.	. .	Ditchley Park, near Woodstock, Oxon.
Casswell, Thomas	. .	Pointon, near Folkingham, Lincolnshire
Castle, Benjamin	. .	Oxford
†Castlereagh, Viscount, M.P. .	23, Chap-st., Gr. sq	
Castree, J.	. .	Gloucester
†Catlin, Thomas W. . . .	. .	Chillesford, Orford, Suffolk
†Cator, Rev. Thomas . . .	. .	Skelbrooke Park, Doncaster, Yorksh.
Caudwell, William . . .	. .	Drayton, Abingdon, Berks.
Cavendish, Hon. Geo. H., M.P.	. .	Ashford Hall, Bakewell, Derbyshire
Cayley, Ed. Stillingfleet, M.P.	. .	Wydale, Malton, Yorkshire
Challock, John	. .	Castle Bromwick, Birmingham
Chamberlain, Henry . . .	. .	Desford, Leicestershire
Champion, Thomas A. . .	. .	Sarr, Thanet, near Canterbury, Kent
Chandler, Thomas . . .	. .	Warminster, Wiltshire
Chaplin, F.	. .	Mulberry Green, Harlow, Essex
Chapman, Thomas . . .	. .	Stoneleigh, Coventry, Warwickshire
Chapman, Thomas . . .	3, Arundel-st., Strd.	
Chapman, George	3, Arundel-st., Strd.	
Charge, Thomas	. .	Barton, Darlington, Durham
Charlton, Thomas Parfect . .	. .	Tonbridge, Kent
Chase, William, jun. . . .	. .	Weston, Petersfield, Hants.
Chasemore, P.	. .	Horsham, Sussex
Chaundy, Richard . . .	. .	Oxford
†Chawner, Richard Croft . .	. .	Wall, Lichfield, Staffordshire
Cheatle, Farmer	. .	Dosthill, Fazeley, Staffs.
Cheatle, William	. .	Stuteley, near Fazeley, Staffs.
Cherry, George Henry . .	. .	Denford, Hungerford, Berks.
Chichester, The Ld. Bishop of	. .	The Palace, Chichester, Sussex
Chichester, J. P. Bruce, M.P.	. .	Arlington House, Barnstaple, Devon.
Chillingworth, William . .	. .	Cuddesden, Tetsworth, Oxon.
Chisman, John	. .	Blackwell, Darlington, Durham
†Cholmeley, Sir Mont. J., Bart.	. .	Easton Hall. Coltersworth, Lincolnshire
Cholmeley, Rev. H. . . .	. .	Troxton, Bury St. Edmund's, Suffolk
Chrisp, Thomas	. .	Hawk Hill, Alnwick, Northumberland
Christie, Langham . . .	. .	Preston Deanery, Hackleton, Northam.
†Chrystie, William	20, Chester-tr. R pk	
Church, Robert	. .	Bishopstoke, Westbury, Wiltshire
Chute, W. Wiggett . . .	. .	Pickenham Hall, Swaffham, Norfolk
Clapham, J.	. .	Lay Hill Common, Chesham, Bucks.
Clark, Joseph	. .	Maidenhead, Berkshire
Clarke, C. J.	. .	Egham, Surrey
Clarke, Joseph, Jun. . . .	. .	Ashby, Sleaford, Lincolnshire
Clarke, K.	35, Southampt.-bls.	
Clarke, Rev. C.	. .	Henstead, Beccles, Suffolk

Members.	Town Residence.	Country Residence.
Clarke, Edward		Canwick, near Lincoln
Clarke, Rev. John		Chertsey, Surrey
Clarke, John		New Parks, near Leicester
Clarke, John		Sutton Marsh, Wisbeach, Cambridgesh.
Clarke, Thos. E.		Chard, Somersetshire
Clarke, Richard		Baldon, Oxford
†Clay, William, M.P.		Fulwell Lodge, Twickenham, Middlsx.
Clayden, John		Littlebury, Saffron Walden, Essex
Clayden, W. Carter		Linton, Cambridgeshire
Cleeve, Henry		Rettendon, Wickford, Essex
Clements, Viscount, M.P.	2, Grosvenor-sq.	Rynn, Mohill, Leitrim, Ireland
Clifton, Capt. T.		
Clinch, J. W.		Witney, Oxfordshire
Clode, William		Bakeham House, Egham, Surrey
Close, John		Great Linford, Newport Pagnell, Bucks.
Clowes, Edmund		Warton, Lancaster
Clutterbuck, Robert		Twyford House, Winchester
Clutterbuck, Thomas		Hardon Huish, near Chippenham, Wilts.
Clutton, John	8, Parliament-st.	
Clutton, Robert	8, Parliament-st.	Hartswood, Reigate, Surrey
Coape, H. Coe	9, York-pl. Baker-st	Maldon, Essex
Cobb, Henry	18, Lincoln's-Inn F	
Cobb, Robert		Town Place, Faversham, Kent
Cobb, Timothy Rhodes		Banbury, Oxon.
Codrington, O. Calley		Wroughton, Swindon, Wiltshire
Cogan, S.		Eastdean, Chichester, Sussex
Coldham, H. W.		Amner, near Lynn, Norfolk
Coles, James		Stratton-Audley, Bicester, Oxon.
Collett, Russell,		The Jungle, near Lincoln
Collingwood, J. V.		Abingdon, Berkshire
Collins, Rev. T. F.		Betterton, Wantage, Berkshire
Cole, Richard John		Chertsey, Surrey
Collard, Edwin.		Chislett Park, Chislett, Kent
Collard, Thomas W.		Canterbury, Kent
†Collins, H.	Oxf. & Camb. Club	
Collyer, Rev. —		Holkham, Norfolk
†Colston, Edward Francis		Weymouth
Colville, Frederick		Barton, Banbury, Oxon.
Colvin, B. B.		Monkhams Hall, Waltham Abbey, Esx.
†Compton, Henry Combe, M.P.	16, CarltonHo.-ter.	Minstead Manor Ho., Lyndhurst, Hants.
Compton, Richard		Eddington, Hungerford, Berks.
Connop, H., Jun.		Enfield, Middlesex
Cook, Rev. Joseph George	118, Pall Mall	Purley Hall, near Reading, Berkshire
Cook, John		Down-Ampney, Cirencester, Glouc.
Cook, John		Hothorpe, Welford, Northamptonshire
Cook, Rev. T. L. B.		Oxford
Cooke, Layton	12, Pall Mall	
†Cooke, P. Davies		Owston, near Doncaster, Yorkshire
Cooke, Rev. T. L.		Beckley, near Oxford
Cooling, John		Lower Winchindon, Thame, Oxon.
Cooper, Isaac		The Bucklands, Bury-St.-Edmund's, Suff.
Cooper, J.		Ingham, Suffolk
Cooper, J. G.		Blythburgh, Southwold, Suffolk
Cooper, Jonathan		March, Isle of Ely, Cambridgeshire
Cooper, Samuel		Henley-on-Thames, Oxon
Cooper, Thomas		Norton, Seaford, Sussex
Cooper, Thomas		Swineshead, Lincolnshire
Cooper, W. D.		Highgate, Middlesex
Coote, W.		St. Ives, Huntingdonshire
Cope, Sir John		Bramshill, Hertfordshire

Members.	Town Residence.	Country Residence.
Copeland, Joseph	. .	Abingdon, Berkshire
Copeland, William	. .	Abingdon, Berkshire
Cormack, William	Covent Garden	
Cormack, William John	Covent Garden	
Cornish, Rev. J. J.	. .	Kenwyn, Truro, Cornwall
Corrance, Frederick	. .	Loudham Park, Woodbridge, Suffolk
Corrie, Adam	. .	Wellingborough, Northamptonshire
Cother, William	. .	Middle Aston, Woodstock, Oxon.
Cottam, George	Winsley-st., Oxf.-s.	
Cotterell, Sir J. Geers, Bart.	. .	Garnons, near Hereford
Cottingham, John	. .	Hardwick, near Chesterfield, Derbyshire
Cottingham, L. O.	. .	Reydon, Southwold, Suffolk
Coupland, Richard	. .	Waddington Heath, Lincoln
Courtney, W.	. .	Newton-Stacey, Whitchurch, Hants.
Coverdale, John	1, Field-ct. Gr's I.	Oak Lodge, Kilburn, Middlesex
Couling, Charles	. .	Rye Farm, Abingdon, Berks.
Coyney, W. Hill	. .	Weston Coyney, Lane End, Staffs.
Cozens, Daniel G., Jun.	. .	Bickenhall, Taunton, Somerset.
Cradock, Sheldon	. .	Hartforth Hall, Richmond, Yorkshire
Cragg, William	. .	Threckingham, Folkingham, Lincolns.
Cramp, John M.	. .	St. Peter's, Isle of Thanet, Kent
Cramp, John	. .	Gurlinge, Margate, Kent
Cripps, Edward	. .	Cirencester, Gloucestershire
Cripps, Joseph, M.P.	. .	Cirencester, Gloucestershire
Cripps, Thomas	. .	Oxford
Cripps, Raymond	. .	Cirencester, Gloucestershire
Crisford, S.	. .	Bull Hotel, Cambridge
†Crisp, Thomas	. .	Gedgrave Hall, Orford, Suffolk
Croft, Sir John, Bart., F.R.S.	45, Brook-street	Cowling Hall, Yorkshire
Crofton, Thomas	. .	Holywell, Durham
Crompton, John Bell	. .	Milford, near Derby
Croome, James	. .	Acton Hall, Berkeley, Stroud, Glouc.
Croone, W.	. .	Tewkesbury
Cross, W. J.		
Crosse, Henry	. .	Boyton Hall, Stowmarket, Suffolk
Crosse, James	. .	Gingley, Retford, Notts.
Crosskill, William	. .	Beverley, Yorkshire
Crouch, A. W.	. .	Ridgmount, Woburn, Bedfordshire
Crowdy, Richard	. .	Faringdon, Berkshire
Crump, John	. .	Ashton-under-hill, Tewkesbury
Crutchley, Percy H.	. .	Sunning-hill Park, Berks.
Cubley, Samuel	. .	Quarrington, Sleaford, Lincolnshire
Cuff, W. Fitchett	. .	Crewkerne, Somersetshire
†Cure, Capel	2, Devonshire-pl.	Blake Hall, Ongar, Essex
Currie, Henry	29, Cornhill	West Horsley Pk., Leatherhead, Surrey
Currie, Edmund	. .	Oakley House, Abingdon, Berkshire
Currie, Raikes, M.P.	4, Hyde Park-ter.	
Curteis, Herbert B.	19, Bridge-st., Wstr	Peasemarsh, Rye, Sussex
Curtis, Adml. Sir Lucius, Bart.	. .	Gatcombe House, Portsmouth, Hants.
Curtis, John	. .	West Rudham, Norfolk
Dadds, James	. .	Wingham, Kent
Dadds, John, sen.	. .	Wingham, Kent
Dadds, John, Jun.	. .	St. Nicholas, Thanet, Kent
Daintree, Richard	. .	Hemingford, St. Ives, Huntingdonshire
Dalton, James	. .	Fillingham Manor, Lincoln
Darlington, Earl of	40, Upp. Brook-st.	
Dashwood, Francis	9, Seam. Pl. Curz. S.	
Dashwood, Rev. Samuel Vere	. .	Stanford, Loughborough, Leic.

Members.	Town Residence.	Country Residence.
Daubeny, Chas., M.D., F.R.S.	. .	Oxford University
Davey, George	. .	Dorchester, near Benson, Oxfordshire
Davey, William	. .	South Park, Headon, Hull, Yorks.
Davenport, George	. .	Oxford
David, Evan	. .	Radyr Court, Cardiff, Glamorganshire
Davies, Evan	. .	Paton, Wenlock, Salop.
Davies, D. Saunders . . .	United Univ. Club	Pentre, Newcastle-Emlyn, Caermarthn.
Davies, Rev. Thomas . . .	. .	Jesus' College, Oxford
†Davis, Samuel	. .	Swerford Park, Banbury, Oxon.
†Davis, Richard	St. Helen's-place	Skeynes, Edenbridge, Seven Oaks, Kent
Davis, Henry	. .	Oakhill, Old Down, Somerset.
Davis, Hewitt	Haymarket .	Spring Park, Croydon, Surrey
Davis, John	. .	Banbury, Oxfordshire
Davis, W.	. .	Radwinter Hall, Sussex
Davis, W. H.	Church-st., Chels.	
Davis, William	. .	Bicester, Oxfordshire
Davis, William	202, Strand	
Davison, Crawford	. .	Pierepoint, Farnham, Surrey
Davison, Thomas	. .	Durham
Dawson, Edward E.	. .	Ingthorpe, Stamford, Lincolnshire
Dawson, Edward	. .	Aldcliffe Hall, Lancaster
Day, Isaac	. .	Northleach, Gloucestershire
Day, Thomas	. .	Wornditch, Kimbolton
Day, W.	. .	St. Neot's, Hunts.
Dean, Rev. Edmund N. . .	. .	Alderleys, near Gloucester
Dean, James	248, High Holborn	The Yews, Tottenham, Middlesex
Deane, Ralph	23, Bentinck-st.	Escourt House, Watford, Herts.
Deare, Thomas	. .	Longworth, Great Faringdon, Berks.
Dearlove, John	. .	Brightwell, Wallingford, Berks.
Deck, Edward	. .	Herringfleet, Lowestoft, Suffolk
Deedes, William	. .	Sandling, Hythe, Kent
Deighton, John	. .	Cambridge
Deighton, Joseph Jonathan .	. .	Cambridge
Delano, William	. .	Tottenham, Middlesex
Demolo, John	. .	Dunton House, Fazeley, Staffs.
†Denbigh, Earl of	. .	Newnham Paddock, Lutterworth, Leic.
Dennis, Robert	. .	Greetham, Horncastle, Lincolnshire
Dent, Joseph	. .	Ribsten Hall, Wetherby, Yorkshire
Denton, Thomas	. .	Lew, Bampton, Oxfordshire
De Vere, Stephen	. .	Currah Chase, Adare, Ireland
De Visme, Rev. James . . .	. .	Bath, Somersetshire
Devon, Earl of	4, Bryanstone-sq.	Powderham Castle, Exeter, Devon.
Dewe, Thomas		
†Dewing, R.	. .	Carbrooke, Watton, Norfolk
†Dickens, Charles Scrace . .	. .	West Stoke, Chichester, Sussex
Dickens, J.	. .	Kimbolton, Huntingdonshire
Dickson, Robert	. .	East Wickham, near Welling, Kent
†Dilke, Captain, R.N. . . .	. .	Maxstoke Castle, Coleshill, Warwicksh.
Dillon, Viscount	. .	Ditchley Hall, near Woodstock, Oxon.
†Divett, Edward, M.P. . . .	20, Chpl.-st, Grov-pl	Bystock, Exmouth, Devon.
Dixon, Charles	. .	Stansted Park, Chichester, Sussex
Dixon, E.	. .	Ashwood House, Dudley, Worcestersh.
Dixon, George	. .	Oxford
Dixon, Henry	. .	Witham, Essex
Dixon, Henry	. .	Oxford
Dixon, Robert Walker . . .	. .	Wickham Bishops, Witham, Essex
Dixon, T. G.	. .	West Rudham, Norfolk
Dobito, George	. .	Kirtling Hall, Newmarket, Cambridges.
Dodd, George	. .	Chenies, Rickmansworth, Herts.
Dodd, W. J., Jun.	. .	Checkendon, Wallingford, Oxfordshire

Members.	Town Residence.	Country Residence.
Dodds, Thomas	. .	Standish Hall, Wigan, Lancashire
Dolby, W.	. .	Marston, Grantham
Dolphin, J.	. .	Swafield, North Walsham, Norfolk
Donaldson, John Strangeways		
Dormer, C. C.	. .	Rousham, Woodstock, Oxon.
Dormer, W.	. .	East Hanney, Abingdon, Berks.
†Dorrien, Charles	. .	Lavant House, Chichester
Dorrien, Mrs.	. .	Lavant House, Chichester
Dove, Lionel	. .	Ulverstone House, Debenham, Suffolk
Drake, C. B.		
Drake, George	. .	Manor Farm, E. Tytherley, Stockbridge
Drake, T. T.	. .	Shardloes, Amersham, Bucks.
†Drax, J. S. W. S. Erle	. .	Charborough Park, Blandford, Dorset.
†Drewe, E. Simcoe	. .	The Grange, Honiton, Devon.
†Drewitt, George	. .	Walberton, Chichester, Sussex
Drewitt, John	. .	Peppering, Arundel, Sussex
†Drewitt, R. Dawtrey	. .	Burpham, Arundel
Drewitt, Thomas	. .	Piccard's Farm, Guildford, Surrey
Drewitt, Thomas, jun.	. .	Guildford, Surrey
Driver, Edward	Richmond-tr, Wh.	
Driver, George N.	Richmond-tr, Wh.	
Druce, Joseph	. .	Ensham, near Oxford
Druce, Samuel	. .	Ensham, near Oxford
†Drummond, Andrew Robert	2, Bryanstone-sq.	Cadland, New Forest, Southampton
Drury, George V.	. .	Eastbourne, Sussex
Duckworth, John	. .	Barnet, Herts.
Duff, A.	. .	Woodcot Ho., Henley-on-Thames, Oxon.
Duke, Charles	. .	East Lavant, Chichester, Sussex
Duke, Henry	. .	Earnley, Chichester, Sussex
Dunn, J.	. .	Dowsby Hall, Folkingham, Linc.
Dunn, Richard	. .	Ryden Farm, Evesham, Worc.
Dunn, Thomas	. .	Kintbury, Newbury, Berks.
Dunnett, Mullens	. .	Lodsworth, Midhurst, Sussex
Dunning, Ralph	. .	Bishop's Burton, Beverley, Yorkshire
Du Pre, Caledon George	. .	Wilton Park, Beaconsfield, Berks.
Dyer, George	. .	East Tisted, Alton, Hants.
Dyke, Rev. H. S.	. .	Polynt, Cornwall
Dymoke, Hon. Champion	10, Whitehall-pl.	Scrivelsley Court, Horncastle, Linclnsh.
Eale, W. H. B.	. .	Holton Park, near Oxford
Eames, John	. .	Ashby-de-la-Zouch, Leicestershire
Edgell, Edgell Wyatt	. .	Milton Place, Egham, Surrey
Edgington, Benjamin	Duke-st. Southwrk.	
Eddleston, Thomas	. .	Cambridge
Edmonds, Albert	. .	Inglesh, Lechlade, Gloucestershire
Edmonds, William	. .	Kilmscott, Lechlade, Gloucestershire
Edmondson, J.	. .	Grass-Yard Hall, Lancaster
Edwardes, Hon. George	. .	Noyadd Llanarth, Aberyron, S. Wales
Edwardes, Hon. William	. .	Edmondthorpe, Oakham, Rutlandshire
Edwards, E.		
Edwards, Frederick	. .	Barnham, Thetford, Norfolk
Edwards, G. Nigel	. .	Henlow Grange, Beds.
Edwards, Henry	. .	Sutton, Woodbridge, Suffolk
Edwards, John	. .	Oxford
Edwin, John	. .	Sheriff's Linch, Worcestershire
†Elliott, John	. .	Chapel Brampton, near Northampton
Ellis, John, M.P.	5, Hereford-st, P.L.	
Ellison, Michael	. .	Sheffield, Yorkshire
Ellison, William	. .	Syzergh Castle, Kendal, Westmoreland

Members.	Town Residence.	Country Residence.
Ellman, Rev. H. J.		Carlton Rectory, near Bedford
Ellman, John		Glynde, Lewes, Sussex
Ellman, R. H.		Glynde, Lewes, Sussex
Ellman, Thomas		Beddingham, Lewes, Sussex
Elphick, William		Steyning, Sussex
Elton, George		Redland, near Bristol
Elwes, J. Meggott		Bossington House, Stockbridge, Hants.
Elwood, Lieut. Col. C. W.		Clayton Priory, Brighton, Sussex
Emson, H.		Cherry Hinton, Cambridgeshire
Emson, R.		Cherry Hinton, Cambridgeshire
Enley, William		Oxford
Ensworth, Thomas		Oxford
Enys, John Samuel		Enys, near Penryn, Cornwall
Erle, Rev. Christopher		Hardwicke, Aylesbury, Bucks.
Etches, John Clifford		Liverpool
Etwall, William		Penton, Andover, Hants.
Evans, Richard		Tyn Park, Cardiff, Glamorganshire
Evans, Richard		Pendeford Hall, Wolverhampton
Evans, Rev. William		Pusey, Faringdon, Berkshire
Evans, W.		
Evans, Isaac Pearson		Evans Griff, Coventry, Warwickshire
Eve, Richard		Silsoe, near Bedford
Everett, Joseph H.		Biddesden House, near Andover, Hants.
Everitt, Isaac	6, Torrington-sq.	South Creake, Fakenham, Norfolk
Ewen, Thos. L'Estrange		Dedham, Essex
Exton, Rev. R. B.		Cretingham, Suffolk
Eyston, Charles		Hendred, Wantage, Berkshire
Eytre, William		Stanton, Shiffnal, Salop.
Fairthorne, Henry		Brightwell, Wallingford, Berks.
Faithful, Rev. G.		Lower Heyford, Bicester, Oxon.
Fane, J.		Wormsley, Stoken-Church, Oxon.
Fardell, John		Lincoln
Farmer, Edward		Fazeley, Tamworth, Staffordshire
Farncombe, George		Bishopstone, Lewes, Sussex
Farrer, Rev. Richard		Ashley, Rockingham, Northamptonsh.
Farrow, Benjamin B.		Ipswich, Suffolk
Farrow, W.		Market Rasen, Lincolnshire
Faulkner, Wm.		Burford, Oxfordshire
Faulkner, John		North-Hinksey, near Oxford
Faulkner, Thomas		Queenford
Faux, Joseph		Cold-Ashby, near Northampton
Favell, Edward		Cambridge
Fawcett, John William		Sedbergh, Yorkshire
Fearon, J., Sen.		
Feilden, William, M.P.	14, Hanover-st.	Feniscowles, Blackburn, Lancashire
Fernie, William		Woodchester, Stroud, Gloucestershire
Field, William		Ulceby, Barton, Lincolnshire
Fielden, Joseph		Wilton House, Blackburn, Lancashire
Fiennes, Hon. Wm. Twisleton	1, D, Albany	Broughton Castle, Banbury, Oxfordsh.
Filliter, George		Trigon Hill, Wareham, Dorset
Finch, Richard		Headington, near Oxford
Finch, Charles		Cambridge
Finch, Rev. W.		Warboys, Hunts.
Finden, George F.	254, High-st. Sthwk	
Finlayson, Dr.		Cheltenham, Gloucestershire
Firmin, W.		Colne Engain, Essex
Fisher, John		East Hanney, Abingdon, Berks.
Fisher, Rev. R. W.		Hill Top, Kendal, Westmoreland

Members.	Town Residence.	Country Residence.
Fisher, Thomas	. .	Kendal, Westmoreland
Fisher, Thomas Richard	. .	Oxford
Fisher, William	. .	Copyhold, Newbury, Berkshire
Flesher, Rev. J. T.	. .	Tiffield, Towcester, Northamptonshire
Fletcher, Sir Henry, Bart.	. .	Ashley Park, Walton-on-Thames, Surr.
Fletcher, John Philip	. .	Ashley Park, Surrey
Flight, Thomas	. .	Laycock's Dairy, Islington, Middlesex
Floyd, Thomas	. .	Frilford, Abingdon, Berks.
Floyer, J. G.	. .	Ketsbyn, Louth, Lincolnshire
†Floyer, John	. .	Stafford, Dorchester, Dorset.
Folkes, Sir W., Bart., F.R.S.	. .	Hillington Hall, near Lynn, Norfolk
Foll, William	. .	Chalgrave, Dunstable, Beds.
Footner, W. A.	. .	Romsey, Hampshire
Ford, Edmund Darby	. .	Stratford-on-Avon, Warwickshire
Fordham, John George	. .	Odsey House, near Royston, Herts.
Fordham, John Edward	. .	Melbourn Bury, Royston, Cambridgesh.
Foreman, Thomas	. .	Acton-Burnell, Shrewsbury, Salop.
Foreshew, William	. .	Meysey-Hampton, Fairford, Gloucester.
Forester, George	. .	Ercall Magna, Wellington, Salop.
Formby, Rev. James	. .	Frindsbury, Rochester, Kent
Forshall, John N.	. .	River Tillington, Petworth, Sussex
Forster, John	18 Carey st, Ln inn	
Forster, Robert	. .	Tottenham Green, Middlesex
Fort, George	. .	Alderbury House, Salisbury, Wilts.
Foster, C. Finch	. .	Cambridge
Foster, J. W.	. .	Clapham, near Settle, Yorkshire
Foster, Ebenezer	. .	Anstey Hall, Cambridge
Foster, Ebenezer, Jun.	. .	Cambridge
Foster, G. E.	. .	Cambridge
Foster, Michael	. .	Shelford, Cambridgeshire
Foster, Richard, Jun.	. .	Cambridge
Foster, John N.	. .	Biggleswade, Bedfordshire
Foster, Joseph	. .	Witham, Essex
Foster, W.	. .	Wordsley House, nr Stourbridge, Worc.
Foster, W.	. .	Sleaford, Lincolnshire
Fothergill, Richard	. .	Bridge House, Kendal, Westmoreland
Fowlis, Rev. Henry	. .	Little Brickhill, Fenny-Stratford, Bucks.
Fowke, William	. .	Rudgeley, Staffordshire
Fowler, Henry	. .	Kingham, Chipping-Norton, Oxon.
Fowler Thomas	Prince's-st, Bank	Tottenham, Middlesex
Fowler, William M.	25, Bentk-st, Cav-sq	Sunning Hill, Windsor, Berkshire
Fowlie, William	. .	Red House, Hursley, Winchester, Hants
Fox, Rev. Dr.	. .	Queen's College, Oxford
Fox, Francis	. .	Tottenham, Middlesex
France, T. R. Wilson	. .	Rawcliffe Hall, near Preston, Lancashire
†Franklin, Richard	. .	Clementstone, Bridgend, Glamorgansh.
Franklin, Edward L.	. .	Ascott, near Benson, Wallingford, Oxon.
Franklin, John	. .	Ewelme, near Benson, Wallingford, Oxon
Franklin, Robert	. .	The Park, Thaxtead, Essex
Fraser, Alexander	. .	Flamstead Bury, Redbourn, Herts.
Frazer, Alexander	. .	Middle-Claydon, Winslow, Bucks.
Freeman, John	. .	Rudham, Rougham, Norfolk
Freeman, Thomas	. .	Henham, Wangford, Suffolk
Freere, Rev. E.	. .	Finningham, Eye, Suffolk
Fremantle, Rt Hon Sir W, GCH	. .	Englefield Green, Chertsey, Surrey
Frost, Edward	. .	West Wratting Hall, near Newmarket
Frost, W. F.	. .	Thorrington, Colchester, Essex
Fryer, William, R.	. .	Lytchett, Poole, Dorset.
Fuge, Robert	. .	7, Drury Square, Clifton, Bristol
Fullagar, James	. .	Milton, Sittingbourne, Kent

Members.	Town Residence.	Country Residence.
Fullard, Thomas	. .	Thorney, Peterborough, Northamptons.
Fullerton, Colonel John	. .	Thrybergh Hall, near Rotherham, York.
Fuller, Hugh	. .	Portslade, Brighton, Sussex
Fulljames, Thomas	. .	Hasfield Court, near Gloucester
Fulljames, Thomas, jun.	. .	Hasfield Court, near Gloucester
Fulshaw, Richard	. .	Knighton, near Leicester
Gabb, Baker	. .	Abergavenny, Monmouthshire
Gabell, Charles	. .	Holyfield, nr Crickhowel, Brecknocksh.
Gage, Hon. William	. .	Westbury House, Eastmeon, Hants.
Gamble, John	. .	Manor Farm, Shouldham Thorpe, Norf.
Gape, Thomas Foreman	. .	St. Alban's, Hertfordshire
Gardner, Austen	. .	Beaksbourn, near Canterbury, Kent
Gardner, James	. .	Adderbury, Banbury, Oxfordshire
Gardner, James	. .	Banbury, Oxfordshire
Gardom, Thomas	. .	The Yell, Baslow, Bakewell, Derbyshire
Garne, William	. .	Aldsworth, Northleach, Gloucestershire
Garnett, Christopher	. .	Low Sizergh, Kendal, Westmoreland
Garrard, Charles Drake	. .	Lamer Hall, Hatfield, Herts.
Garrett, Richard, jun.	. .	Leiston, Saxmundham, Suffolk
Gascoyen, George	. .	Birchmore, near Woburn, Beds.
Gaskell, W. Penn	Reform Club . .	Cheltenham, Glouc.
Gater, Caleb H.	. .	Swathling, near Southampton, Hants.
Gater, Edward	. .	Townhill, near Southampton, Hants.
Gater, W. B.	. .	West End, near Southampton, Hants.
Gates, George	. .	Steyning, Sussex
Gates, John	. .	Illington, near Watton, Norfolk
Gates, Richard	. .	Marshall Vale, Bramby, Guildford, Sur.
Gayford, Dennis	. .	Croxton, near Thetford, Norfolk
Gayford, George	. .	Rymer House, Thetford, Norfolk
Geard, Charles	. .	Hitchin, Herts.
Gedney, John	. .	Redenhall, Harleston, Norfolk
Gee, Thomas	. .	Boston, Lincolnshire
Gibbon, Alexander	. .	Staunton, near Newnham, Glouces.
Gibbs, George	26, Down-st., Pic.	.
Gibbs, Joseph	. .	Elsfield, near Oxford
Gibbs, Thomas	24, Half-Moon-st.	Ampthill, Bedfordshire
Gibbs, William	. .	Alveston Hill, Stratford-on-Avon, War.
Gibbs, William	. .	Itchenor, Chichester, Sussex
Giblett, John	8, West Smithfield	
Gibson, George John	. .	SandgateLdg,Storrington,Petworth,Sus.
Gilbertson, Matthias	. .	Elm Cottage, Egham, Surrey
Gilbert, Rev. A. T.	. .	Hippenscombe, Wiltshire
Gilbert, George	. .	Colchester, Essex
Gilbert, William		
Gillett, Joseph	. .	Little Haseley, Tetsworth, Oxfordshire
Gillett, Joseph Ashby	. .	Banbury, Oxfordshire
Gillett, William	. .	Southleigh, Witney, Oxfordshire
Gilliat, Aitkin	. .	Scrofield, Horncastle, Lincolnshire
Gills, W.	. .	Alveston Heath,Stratford-on-Avon,War.
Gladwin, Thomas	. .	Marden Park, Godstone, Surrey
Glaister, Henry R.	. .	Bedale, Yorkshire
Glaister, Rev. William	. .	University College, Oxford
Glass, James	. .	Wooton, Devizes, Wilts.
Glasscock, Josiah	. .	Castle Hedingham, nr Halstead, Essex
Glover, John	. .	Bangley, Tamworth, Staffs.
Goard, Richard	. .	Hartlip, Sittingbourne, Kent
Goddard, Horatio N.	. .	Cliff, Wootton Bassett, Wiltshire
Goddard, Edward	. .	Crookham, Newbury, Berkshire

Members.	Town Residence.	Country Residence.
Goddard, Philip		
Goddard, Rev. Richard . .	. .	Broadstone, Church Euston, Oxon.
†Godfrey, Edward	. .	OldHall,East-Bergholt, Hadleigh, Suff'k
Godfrey, George	. .	Childrey, Wantage, Berkshire
Godfrey, Thomas	. .	Chawley, near Oxford
Godwin, John	. .	Durweston, Blandford, Dorset.
Godwin, Richard	. .	Durweston, Blandford, Dorset.
Goldhawk, Rowland, Jun. .	. .	Hazle Hall, Sheer, Guildford, Surrey
Gomme, John	. .	St. Julians, near St. Alban's
Gonne, Thomas George . .	. .	Great Vaynor, Narbeth, Pembrokeshire
Good, George	. .	Gussage, Blandford, Dorset.
†Goodden, John	. .	Compton House, Sherborne, Dorset.
Goodenough, Joseph . . .	. .	Nether-Cerne, Dorchester, Dorset.
Goodhall, Michael . . .	. .	Evelith Manor, Shiffnal, Salop.
Goodlake, T. Mills . . .	. .	Wadley House, Faringdon, Berks.
Goodlake, Thomas . . .	. .	Benhams, Wantage, Berks.
Goodricke, SirFrancis L.H., Bt.	. .	Studley Castle, Alcester, Warwickshire
Goodwin, Edmund . . .	. .	Harlow, Essex
Gordon, Lord George . .	. .	Chesterton, Stilton, Hunts.
Gore, Ormsby, M.P. . . .	66, Portland-place	
†Goring, Harry Dent, M.P. .	Windham Club .	Highden, Shoreham, Sussex.
Goring, Mrs.	. .	Wiston Park, Steyning, Sussex
Goring, Charles	. .	Wiston Park, Steyning, Sussex
Gorringe, J. P.	. .	Eastbourne, Sussex
Gosford, William	. .	Everingham, Pocklington, Yorkshire
Gosling, Bennett	19, Fleet-street .	Roehampton Grove, Surrey
Gosling, Edward	. .	Sonning, Reading, Berks.
Gough, Frederick	. .	St. Alban's, Hertfordshire
Gould, John	. .	Poltimore, Exeter, Devonshire
Gould, Richard	. .	Hope Hall, near Manchester
Gower, G.	. .	Dilham, North Walsham, Norfolk
†Gower, W. Leveson, Jun. .	33, Low. Brook-st.	Titsey Place, Godstone, Surrey
Gowing, Edward	. .	Eye, Suffolk
Graburn, R. S.	. .	Branswell Cottage, Sleaford, Lincolns.
Graburn, William	. .	Barton-on-Humber, Lincolnshire
Grace, James	. .	Wordrobes, Risborough, Bucks.
Graham, Captain, R.N. . .	. .	Netherby Hall, Longtown, Cumberland
Graham, Rev. H. G. . . .	. .	Netherby Hall, Longtown, Cumberland
Grain, Rev. Charles . . .	. .	Linton, near Cambridge
Grain, Peter, Jun.	. .	Shelford, near Cambridge
Granger, Thomas W. . . .	. .	Stretham, Cambridgeshire
Grant, J. C.	. .	Stamford, Lincolnshire
Grant, John	. .	Leighton Buzzard, Beds.
Grant, Jonathan	. .	Devizes, Wiltshire
Grant, William	1, Plowden-bs., Tem.	Litchborough, Towcester, Northampt.
Grantham, Stephen . . .	. .	Stoneham, Lewes, Sussex
Grantham, Rev. Thomas . .	. .	Bramber, Steyning, Sussex
†Gratwick, W. G. K. . . .	. .	Ham, Arundel, Sussex
Greaves, Robert	. .	Bloxholm, Sleaford, Lincolnshire
Greaves, Edward	. .	Barford, near Warwick
Greaves, Richard	. .	Shottery, Stratford-on-Avon, Warw.
Greaves, William	. .	Bakewell, Derbyshire
Green, Richard	. .	Great Gonnerby, Grantham, Lincolns.
Green, J.		
Green, Rev. George Wade .	. .	Court-Henry, Llandilo, Carmarthenshire
Green, William.	59, Up. Seymour-st.	
Greene, Thomas, M.P. . .	. .	Whittington Hall, Lancaster
Greene, W. Burnaby . . .	. .	Wickham, Bishop's Waltham, Hants.
Greenwood, Charles . . .	. .	Wallingford, Berkshire
†Gregg, Thomas	. .	Coles Park, Hertfordshire

Members.	Town Residence.	Country Residence.
†Gregory, Arthur F.	. .	Styvichal Hall, Coventry, Warwicks.
Gregory, William	. .	Cirencester, Gloucestershire
Gregory, Thomas	. .	Cutslow, near Oxford
Gresley, Rev. W.	. .	St. Charles, Lichfield, Staffordshire
Grey, Sir Chas.Edw., Bt., M.P.	. .	The Oaks, Carshalton, Surrey
Grey, John	. .	Dilston, Newcastle, Northumberland
Grey, W. H. C.	10,Cmb.-pl.,N.Rd.	Clifton, near Bristol, Gloucestershire
Griffin, John	. .	Hemel-Hemstead, Hertfordshire
Griffith, C. Darby	. .	Padworth House, Reading, Berkshire
Griffith, Mrs. Darby . . .	. .	Padworth House, Reading, Berkshire
Griffith, Samuel Y. . . .	. .	Oxford
Grimshaw, W.		
Groome, Charles	. .	Sompting, Shoreham, Sussex
Grove, L.	. .	Shenstone Park, Lichfield, Staffords.
†Grove, Thomas	. .	Fern House, Shaftesbury, Dorsetshire
Guerrier, William	8, West Smithfield	
Guillemard, John L., F.R.S. .	27, Gower-street	Clavering, Stansted-Montfitchet, Essex
Gunner, William	. .	Will Hall, Alton, Hampshire
Gunning, H.	. .	Cambridge
Gurdon, Rev. Philip . . .	. .	Cranworth, Shipdam, E.Dereham, Nflk.
†Gurdon, William	10, Crown-Off.-row	
Guy, George	. .	The Turl, Oxford
Gwilt, Rev. Daniel . . .	. .	Icklingham Rectory, Mildenhall, Suffk.
Gwynne, Captain A. L. . .	. .	Monachty, Cardiganshire
Hack, James	. .	Bowley, Chichester, Sussex
Haines, Edward	. .	Stratton, Cirencester, Gloucestershire
Halcomb, William . . .	. .	Poulton, Marlborough, Wiltshire
Halcomb, W. H.	. .	Chilton, Hungerford, Berkshire
Hale, Edward	. .	Hambledon, Horndean, Sussex
Hall, Thomas	. .	East Hanney, Abingdon, Berks.
Halke, Rev. J	. .	Weston-by-Welland, Northamptonshire
Halton, John		
†Hall, John	. .	Wiseton, near Bawtry, Nottinghamsh.
Hall, John	. .	Bretforton, Evesham, Worcestershire
Hall, George	. .	Ely, Cambridgeshire
Hall, George Webb . . .	. .	Sneed Park, Bristol
Hall, Henry		
Hall, James	. .	Scorborough, Beverley, Yorkshire
Hall, Richard	. .	Cirencester, Gloucestershire
Halsted, Thomas	. .	Woodcote, near Chichester, Sussex
†Hamilton, Captain Archibald	. .	Rozelle, near Ayr, N.B.
Hammans, C.	. .	Garford, Abingdon, Berkshire
Hammersley, Hugh . . .	69, Pall Mall . .	Great Haseley, Tetsworth, Oxfordshire
Hammond, E.	. .	Rymer House, near Thetford, Norfolk
Hammond, Thomas . . .	. .	Ashley, Newmarket, Cambridgeshire
Hammond, W.	. .	Fenstanton, St. Ives, Huntingdonshire
Hamond, Wm. P.	123, Mount street	
Hampton, J.	. .	Coombs, Shoreham, Sussex
Hanbury, Edward . . .	. .	Hackeston, Wickham Market, Suffolk
Hanbury, John	. .	Carborough, Lichfield, Staffordshire
Hanbury, Osgood	. .	Coggeshall, Essex
Hancock, Abraham . . .	. .	Hall Place, Rockley, Alton, Hants.
Handley, Major	. .	Pointon, Folkingham, Lincolnshire
Hanford, Edward	. .	Woollas Hall, near Pershore, Worc.
Hanmer, Lieutenant-Colonel .	. .	Bear Place, Maidenhead, Berks.
Hannam, George	. .	Alland Grange, Isle of Thanet, Kent
Hannam, Henry S. . . .	. .	Burcott, Bensington, Oxfordshire
Hannam, Henry, Jun. . .	. .	Oxford

Members.	Town Residence.	Country Residence.
Hanson, John	37, Seymour-place	
Harcourt, Capt. Octavius, R.N.	. .	Swinton Park, Bedale, Yorkshire
Harcourt, W. B.	. .	St. Leonard's, Windsor, Berks.
Harding, Joseph	. .	Maiden-Bradley, Mere, Wiltshire
Hardman, Edward . . .	. .	Royal Dublin Society, Dublin
Hardwick, Earl of . . .	. .	Wimpole, Arrington, Cambridgeshire
Hardy, J.	. .	Tendring Hall, Colchester, Essex
Hare, Charles James . . .	. .	Wormley, Herts.
Hare, Joseph	. .	Wilton Farm, Beaconsfield, Bucks.
†Hare, John	. .	Springfield, Bristol
Hare, Sir Thomas, Bart. . .	12, Clarges-st. Pic.	Stow Hill, Downham Market, Norfolk
Harford, John Scandret, F.R.S.	. .	Blaize Castle, near Bristol
†Harford, W.	. .	Barly Wood, Bristol
Harlock, W., Jun. . . .	. .	Ely, Cambridgeshire
Harris, George Hemington .	. .	Cambridge
Harris, Henry Hemington .	. .	Park Lodge, Cambridge
Harris, John	. .	Hinton, Abingdon, Berkshire
Harris, Richard	. .	Wootton Grange, Northamptonshire
Harris, William	. .	Weston, Leamington, Warwickshire
†Harrison, Richard	. .	Wolverton, Stony-Stratford, Bucks.
Harrison, Daniel	. .	Kendal, Westmoreland
Harrison, Rev. J.	. .	Dinton, Aylesbury, Buckinghamshire
Harrison, John	. .	The Bank, Bakewell, Derbyshire
Harrison, John	. .	Home Farm, Stow Bardolph, Norfolk
Harrold, O. W.	. .	Donnington Court, Ledbury, Herefordsh.
Hart, Captain	. .	Wimpole Arrington, Cambridgeshire
Hart, H. P.	. .	Beddingham, Sussex
Hart, W.	. .	32, Brunswick-square, Brighton
Hartt, James	. .	Billingford, Elmham, Norfolk
Harvey, Robert Blyth . .	. .	Harleston, Norfolk
Harvey, Robert Ridout . .	. .	Sturminster, Newton, Dorsetshire
Harwood, Thomas	. .	Winterfold, Kidderminster, Worcestersh
Hartley, W. H. H. . . .	. .	Bucklebury House, near Newbury, Berks.
Haselfoot, R. C.	. .	Boreham, Chelmsford, Essex
Hasler, Richard	. .	Aldingbourne, Chichester, Sussex
Hastings, John	. .	Longham, East Dereham, Norfolk
Hastings, Matthew . . .	. .	Ensham, Witney, Oxfordshire
Hawker, Admiral	. .	Ashford, Petersfield
Hawkesley, Rev. J. W. . .	. .	Redruth, Cornwall
Hawkins, Thomas	. .	Newant, Gloucestershire
Hawkins, Thomas	. .	Staunton Court, near Gloucester
†Hawkins, Thomas	. .	Assington, Moor, Sudbury, Suffolk
Hawkins, W.	. .	Hawthorns, near Gloucester
Hawkins, William	. .	Hitchin, Hertfordshire
Hawkins, William . . .	. .	Colchester, Essex
Hawkins, J. H.	. .	Dorchester, Dorsetshire
Hawkins, John	. .	Hitchin, Hertfordshire
Hawtrey, John		
Haydon, Josiah	. .	Baldock, Hertfordshire
Haynes, William	. .	Handborough, Woodstock, Oxfordshire
Hayward, Asa	. .	Halstead, Essex
Hayward, William . . .	. .	Hintlesham, Hadleigh, Suffolk
Hayward, Drinkwater S. . .	. .	Frocester Court, Stroud, Gloucestershire
Hayward, J.	. .	Worcester
Hayward, J. Curtis . . .	. .	Quedgeley, near Gloucester
Hayward, Henry	. .	Watlington, Henley-on-Thames, Oxon.
Hayward, Henry		
Hayward, Joseph	. .	Beechinstoke, Devizes, Wilts.
Hayward, Robert	. .	Colchester, Essex
Hayward, William. . . .	. .	Manor House, Weston Turville, Bucks.

Members.	Town Residence.	Country Residence.
Headley, Henry	. .	Cambridge
Heald, Dr.	. .	Spalding, Lincolnshire
Heard, W.	. .	St. Margaret's, Ware, Herts.
Hearne, Stephen Street	. .	Broom, Alcester, Warwickshire
Heath, Sergeant	. .	Kitlands, Dorking, Surrey
†Heathcote, J. Moyer	29, Green-st.Gr.sq.	Conington, Hunts.
Hedding, James	. .	Chawson Manor Fm., nr St.Neots, Hunts.
Heighington, Edward	. .	Woburn, Bedfordshire
Heiver, John		
Heming, Henry	. .	Brampton, Northamptonshire
Hemming, W. K.	. .	Eltham Place, Foxley Road, Kennington
Hemsworth, H. D'Estere	. .	Shropham Hall, Larlingford, Norfolk
Heneage, Geo. H. Walk., M.P.	. .	Compton Bassett, Calne, Wilts.
Henning, James	. .	Wolverton, Dorchester, Dorset.
Hercy, John	. .	Hawthorn Hill, Maidenhead, Berks.
Herrick, William	. .	Bear Manor Park, Loughboro', Leic.
Herver, Joseph		
Hervey, Lionel	. .	Winkfield, Bracknell, Berkshire
Heseltine, William	. .	Worlaby House, Barton, Lincolnshire
Hester, George P.	. .	Oxford
Hewer, Jasper	. .	Minchinhampton, Gloucestershire
Hewer, John	. .	Hampton Lodge, near Hereford
Hewer, Joseph	. .	Farmington, Northleach, Gloucest.
Hewer, William	. .	Northleach, Gloucestershire
Hewitt, Lieut. R.N.	. .	Eastbourne, Sussex
Hewitt, Richard	. .	Dodford, Weedon, Northamptonshire
Heygate, Robert	. .	West Haddon, Daventry, Northampt.
Heysham, Rev. J.	. .	Carlisle
†Heywood, Sir Benjamin, Bt.	9, Hyde Pk. Gard.	Claremont, near Manchester
Hicks, Leonard	5, Gray's-Inn-sq.	
Hicks, Benjamin	. .	Handley, Blandford, Dorset.
Hicks, Edward	. .	Wilbraham Temple, Newmarket
Hickson, Richard	. .	Holbeach Marsh, Holbeach Linc.
Hickson, Richard	. .	Hougham, Grantham, Lincolnshire
Higgins, William	. .	Hambledon, Horndean, Hants.
Higgins, W. B.	. .	Picts' Hill, Bedfordshire
Hill, Rev. C.	. .	Buxhall, Stowmarket, Suffolk
Hill, Charles	. .	Wellingborough, Northamptonshire
Hill, Henry	. .	Sledmere, Malton, Yorkshire
Hillyard, C.	. .	Thorpelands, near Northampton
Hincks, T. C.	. .	Breckenborough, Thirsk, Yorkshire
Hind, James	. .	Morebairns, Lutterworth, Leicestershire
Hind, William	. .	Groby, Leicestershire
Hinds, Charles	. .	Perth, Australia, Swan River
Hinton, William	. .	Daglingworth, Cirencester, Gloucesters.
Hinxman, Edward, Jun.	. .	Little Durnford, Salisbury, Wilts.
Hitchcock, Henry	. .	Bodicot House, Banbury, Oxfordshire
Hitchcock, Henry	. .	Overton, Marlborough, Wilts.
Hitchcock, Simon	. .	Stanton, Devizes, Wilts.
Hitchman, S.	. .	Chipping-Norton, Oxfordshire
Hitchings, George	. .	Oxford
Hoare, Captain	. .	Wavendon, Fenny-Stratford, Bucks.
Hoare, Hugh Richard	100, Eaton-square	Lillingstone, Towcester, Northamp.
Hobbs, B.	. .	Earl's Colne, near Halstead, Essex
Hobbs, Henry	. .	Bocking, Braintree, Essex
Hobbs, William	. .	Bocking, Braintree, Essex
Hobbs, William	. .	Hythe, Kent
Hobbs, William Fisher	. .	Mark's Hall, Coggeshall, Essex
Hobgen, Charles	. .	Sidlesham, Chichester, Sussex
Hobgen, John	. .	Fletchers, Siddlesham, Chichester, Sus.

Members.	Town Residence.	Country Residence.
Hobgen, Joseph	. .	Sidlesham, Chichester, Sussex
Hoblyn, William Paget . .	. .	Marlhouse, Elmstead, Bromley, Kent
Hodge, L. Lovell	7, Ulster-pl. Reg. pk.	
Hodgkinson, Richard . . .	. .	Morton Grange, Retford, Notts.
Hodson, W.		
Hodson, James.	. .	Falmer Court Farm, Lewes, Sussex
Hogg, W.	. .	Biggleswade, Beds.
Holbeach, William . . .	. .	Farnborough, Banbury, Oxon.
Holcombe, Rev. George Francis	. .	Brinkley, Newmarket, Cambridgeshire
†Hollist, Hasler	. .	Lodsworth, Midhurst, Sussex
Holmes, William Sandcroft .	. .	Redenhall, Harleston, Norfolk
Holton, Rev. L. M. . . .	. .	Woolhampton, Newbury, Berkshire
†Hony, Rev. P. F.	Athenæum Club .	
Honywood, Rev. P. J. . . .	. .	Mark's Hall, Coggeshall, Essex
Hooton, John Head . . .	. .	Kempston, near Bedford
Hopcraft, Alfred	. .	Halse, Brackley, Northamptonshire
Hopkins, John	. .	Tidmarsh House, Reading, Berks.
Hopper, Richard	. .	Papplewick, near Nottingham
Horlock, J. W.	. .	The Rooks, Marshfield, Tetbury, Glouc.
Hornby, Hugh	. .	Ribby Hall, Kirkham, Lancashire
Hornsby, Richard	. .	Grantham, Lincolnshire
Horwood, John	. .	Stean Park, Brackley, Northamptonsh.
Hoskins, Kedgwin, M.P. . .	90, Sloane street .	Birch House, Ross, Herefordshire
Hoskins, Sir Hungerford, Bt	. .	Harewood, Ross, Herefordshire
Hoskyns, Chandos Wren . .	10, Chester-square	Wroxhall Abbey, Warwickshire
Houblon, Richard Archer .	. .	Coopersale, Epping, Essex
Houghton, John	. .	Broom Hall, Sunninghill, Windsor, Brks.
Houldsworth, Thomas, M.P. .	16, Suffolk-street	Portland Place, Manchester, Lanc.
House, John	. .	Anderson, Blandford, Dorset.
House, John, jun.	. .	Quarleston, Blandford, Dorset.
Howard, Charles	. .	14, Monkgate, York
Howard, George	. .	Hemel Hempstead, Herts.
Howard, Hon. Henry . .	. .	Charlton, Malmesbury, Wilts.
Howard, Henry	. .	Greystoke, Penrith, Cumberland
Howard, Joseph	. .	Aylesbury, Bucks.
Howard, T. A.	. .	Yattendon, near Newbury, Berks.
Howard, J, ...	. .	Aylesbury, Bucks.
Howard, Col. Sir R., Bt., M.P.	Belgrave-square .	Bushy Park, Bray, Wicklow
Howard, William	. .	Stafford
Huckvale, Thomas . . .	. .	Over-Norton, Chipping-Norton, Oxon.
Hudson, John	. .	Castleacre, Swaffham, Norfolk
Hull, Richard	. .	Sutton-Benger, Chippenham, Wilts.
Humfrey, J.	. .	Upton, Abingdon, Berks.
Humfrey, John	. .	Upton, Abingdon, Berks.
Humfrey, William . . .	. .	Boxford, Newbury, Berks.
Hunt, James	. .	Oxford
Hunt, James	10, Whitehall	
Hunt, W. Ogle	10, Whitehall .	Coomb Wood Lodge, Kingston, Surrey
Hunt, Zachary D.	. .	Aylesbury, Bucks.
Hurrell, Reymes	. .	Brandon Hall, Suffolk
Hurrell, Swann	. .	Cambridge
Hutley, William	. .	Witham, Essex
Hutt, John	. .	Water Eaton, near Oxford
Hutt, William	. .	Thrupp, Woodstock, Oxon.
Hutton, John	. .	Sowber Hill, Northallerton, Yorkshire
Hutton, William	. .	Gate Barton, Gainsbro', Lincolnshire
Ide, John	. .	West Wittering, Chichester, Sussex
Ifill, Benjamin	59, Welbeck-street	

Members.	Town Residence.	Country Residence.
Ifill, William, M.D.	9, Welbeck-street	Barbadoes, West Indies
†Iles, Francis		Barnoldby-le-Beck, Grimsby, Linc.
Ilott, James A.		Bryanston, Blandford Forum, Dorset.
Inge, Captain Thorpe		Tamworth, Staffordshire
Ingram, Hugh		Steyning, Sussex
Ingram, Rev. James, D.D.		Trinity College, Oxford
Inskip, Thomas		Marston, Ampthill, Bedfordshire
Irving, John, M.P.	1, Richm-terr. W.H.	Ashford, near Staines, Middlesex
Isaacson, John		Clare, Suffolk
Iveson, John		Halliford, Chertsey, Surrey
Izard, William		Grafton-in-Beckford, Gloucestershire
Jackman, James		Crendon, Thame, Oxfordshire
Jackson, Hugh		Wisbeach, Isle of Ely, Cambridgeshire
Jaques, R. M.		St. Triuian's, Richmond, Yorkshire
Jarratt, William		Lletai, Bridgend, Glamorganshire
†Jarrett, John		Camerton House, Bath, Somerset.
Jeffrys, R.		Structshill, Bridgewater, Somerset.
Jellicoe, John		Beighterton, near Shiffnal, Salop.
Jemmett, Henry		Burford, Oxfordshire
Jenkins, John		St. Y-Nill, Cardiff, Glamorganshire
Jenner, Henry		Chisenbury, Pewsey, Wiltshire
Jennings, R. F.		Belsham Green, Sandwich, Kent
Jersey, Earl of,	38, Berkeley-sq.	Middleton Park, Bicester, Oxfordshire
Jervis, Sir Raymond	Union Club	Fair Oak Park, Winchester, Hants.
Jeston, Thomas		Henley-on-Thames, Oxon.
Jobson, Robert		Turrelaws, Wooler, Northumberland
Jobson, William		Newtown, Wooler, Northumberland
Jodrell, Sir Rd. Paul, Bt. FRS.	64, Portland-place	Sall Park, Reepham, Norfolk
Johnson, Rev. A.		Hampton House, Devon.
Johnson, Rev. Dr.		Perran, Cornwall
Johnson, Cuthbert William	14, Gray's-inn-sq.	Wallingtons, Newbury, Berks.
Johnson, George	53, Tavistock-sq.	
Johnson, Theophilus Fairfax		Spalding, Lincolnshire
†Johnson, Thomas		Whittlesey, Cambridgeshire
Johnston, Rt. Hon. Sir Al. Bt.	19, Gt. Cumb.-pl.	York House, Twickenham, Middlesex
Johnston, Sir F., Bart.		Melton Mowbray, Leicestershire
Johnstone, Rev. George		Broughton, Hunts.
Johnstone, George	53, Tavistock-sq.	
Johnstone, John Hutton		Menston, near Ledbury, Herefordshire
Joly, Frederick	51, Threadneedle S.	
Jonas, Samuel		Ickleton, Saffron Walden, Essex
Jones, Edward		Shiffnal, Salop.
Jones, Philip, Jun.		Sugwas Court, near Hereford
Jones, John		Harrington, Spilsby, Lincolnshire
Jones, J. Whitmore		Chastleton, Chipping Norton, Oxon.
Jones, William		Sheep House, near Gloucester
Jordan, Rev. G. W.		Waterstock, Thame, Oxfordshire
Josselyn, John		Sproughton, near, Ipswich
Jowett, Rev. J. F.		Kingston, Bagpuze, Abingdon, Berks.
Juckes, Thomas		Tearn Farm, Wellington, Salop.
Kedward, James D.		
†Kemble, Horatio		Leggatt's, near Hatfield, Hertfordshire
†Kemble, Thomas	125, Piccadilly	Leggatt's, near Hatfield, Hertfordshire
Kendall, Samuel		H. M. Norf. Farm, Sunninghill, Chertsey
Kendle, C. J.		Fordham, Downham Market, Norfolk
Kendle, James		Weasenham, Fakenham, Norfolk
†Kennaway, Sir John, Bart.		Escot, Honiton, Devonshire
Kensey, George		Cornbury Park Farm, Witney, Oxon.

Members.	Town Residence.	Country Residence.
Keppel, Hon. and Rev. Thos.	. .	Warham, Wells, Norfolk
Kersey, James	. .	Talton, Cirencester, Gloucestershire
Kersey, Robert	. .	Cross, Hadleigh, Suffolk
Kett, George Samuel	. .	Brooke House, Norwich, Norfolk
Kilby, George	. .	Queensborough, Leicestershire
Kilson, Rev. H.	. .	Folkington, Hailsham, Sussex
Kimberley, George	. .	Trotsworth, Egham, Surrey
Kimber, Thomas	. .	Fyfield Wick, Abingdon, Berks.
Kimber, Thomas	. .	Bourton-on-the-Water, Stow, Glo'ster.
Kimber, Thomas	. .	North Cerney, Cirencester, Gloucester.
†Kinder, John	. .	Sandridge Bury, St. Alban's, Herts.
Kinder, Thomas	. .	Sandridge Bury, St. Alban's, Herts.
King, Bolton	44, Grosvenor-squ.	Umberslade, Warwickshire
†King, Charles	. .	Little Brinton, Northamptonshire
King, F.	. .	Oxford
†King, Fielder	. .	Buriton, Petersfield, Hants.
King, J. Bennett	. .	Wotton, Abingdon, Berkshire
King, John	. .	Loxwood House, Petworth, Sussex
King, Joseph	. .	Whitehall, Stourbridge, Worc.
King, Rev. James	. .	Henley-on-Thames, Oxfordshire
King, Robert	. .	Wytham, near Oxford
King, W.	. .	Brinkley Hall, Newmarket
King, W.	. .	Godalming, Surrey
King, W. F.	. .	Stourton, Mere, Wiltshire
†Kingscote, Thomas	. .	Kingscote, Tetbury, Gloucestershire
†Kingsmill, William	. .	Sydmonton Park, Newbury, Hants.
Kinsman, Rev. R. B.	. .	Falmouth, Cornwall
Kintore, Earl of	. .	Keith Hall, Aberdeenshire
Kirby, John	. .	South Moreton, Wallingford, Berks.
Knapp, H.	Haberdashers' Hall	
†Knatchbull, William	. .	Babington, Frome, Somersetshire
Kneshaw, W.	. .	Bury St. Edmund's, Suffolk
†Knight, Henry Gally, M.P.	69, Grosvenor-st.	Firbeck Hall, Bawtry, Yorkshire
Knight, Edward	. .	Godmersham Park, Canterbury, Kent
Knight, E. Jun.	. .	Chawton House, Alton, Hants.
Knight, Edward Butt	. .	Coleorton Hall, Ashby-de-la-Zouch
Lacey, James Murray	20, Carey-st. Ln. I. F.	
La Coste, Thomas B.	. .	Abbey Mills, Chertsey, Surrey
Lakin, Edward	. .	Beauchamp Court, near Worcester
Lakin, Henry	. .	Severn End, Upton, Worcestershire
Lamb, William	. .	Hay Carr, Ellel, Lancaster
Lance, Edward Jarman	95, Albany-street	Barossa Cottage, Bagshot, Surrey
Landor, H. Eyres	. .	Warwick
Lane, John	5, Inner Temp.-lan.	
Langdale, Hon. Charles, M.P.	. .	Houghton Hall, Market-Weighton, York
Langford, T. C.	. .	Udinore, Rye, Sussex
Large, Charles	. .	Broadwell, Burford, Oxfordshire
Large, William	. .	Upper Lambourn, Berkshire
Larratt, Daniel	. .	Thurlby, Lincolnshire
Latham, R. Cousins	. .	Clifton, Dorchester, Oxfordshire
Lattemore, Charles	. .	Bird Hall Farm, Sandridge, St. Alban's
†Law, Rev. R. V.	3, Up. Geo.-st. M. sq.	Christian-Malford, Chippenham, Wilts.
Lawford, Edward	. .	Leighton-Buzzard, Bedfordshire
Lawford, John	. .	Mount Pleasant, Tottenham, Middlesex
Lawford, William Robinson	. .	Leighton-Buzzard, Bedfordshire
Lawley, W.	. .	Peterborough, Northamptonshire
Lawrance, William	. .	Lee-Gomery House, Wellington, Salop
Lawrence, Capt. J. R.	. .	East Harptree, Wells, Somersetshire

Members.	Town Residence.	Country Residence.
Lawrence, James		
Lawrence, R.	. .	Betterton, Wantage, Berkshire
Lawson, Andrew	. .	Aldborough Ldg., Boroughbridge, Yorks.
Lawson, Robert	11, Keppel-st. R. sq.	
Lawson, W. C.	. .	Edinburgh
Layburn, Daniel	. .	Eske, Beverley, Yorkshire
Layburn, Jonathan . . .	. .	Wold Cottage, Bridlington, Yorkshire
Laxton, R. W.	. .	Morborn, Stilton, Huntingdonshire
Leach, George	. .	Stoke, Devonport, Devonshire
Le Couteur, Colonel John .	. .	Belle-Vue, Jersey
Lediard, Thomas	. .	Cirencester, Gloucestershire
†Lee, Lee J.	. .	Dillington House, Ilminster, Somerset.
Leeds, E. Thurlow . . .	. .	Eyeberry House, Eye, Peterborough
Lees, Charles	. .	Eastling, Faversham, Kent
Lees, George Wyld . . .	47, Fleet-street	
Lefevre, John G. Shaw, F.R.S.	5, Hyde Park-gard.	
Lefroy C. E.	24, Old-sq., Linc. I.	Emshot House, Farnham, Surrey
Legard, George	. .	Fangfoss, Pocklington, Yorkshire
Leifchild, John	Moorgate-st., Fins.	
Le Jeune, Henry	. .	Westfields, near St. Alban's, Herts.
Lemmon, Charles	. .	Coltshall Farm, Shouldham, Norfolk
Lescher, Joseph	. .	Boyles, Brentwood, Essex
Lethbridge, Sir Thos. B., Bart.	6, Upp. Blgrave-st.	Sandhill Park, Taunton, Somerset.
Lewis, John	. .	Llanthetty Hall, near Brecon, S. W.
Lewis, Edward	. .	Bayford Bury, near Hertford
Lewis, Robert	. .	Stompain, Blandford, Dorset.
Ley, Jacob	. .	Christ Church, Oxford
Lidbetter, Richard	. .	Bramber, Steyning, Sussex
Liddon, John William . .	. .	Hemel Hempstead, Hertfordshire
Liefchild, W. G.	. .	Enfield, Middlesex
Lilford, Lord	10, Grosvenor-pl.	Lilford Hall, Oundle, Northamptonshire
Lincoln, Earl of	25, Park-lane . .	Ranby Hall, Retford, Nottinghamshire
Lindsell, Rev. E.	. .	Broom Hall, Biggleswade, Beds.
Lindsell, R.	. .	Biggleswade, Bedfordshire
Lindsell, Thomas	. .	Hemingford, St. Ives, Huntingdonshire
Lines, W.	. .	Haddenham, Thame, Oxfordshire
Linnell, Richard	. .	Stowe, Weedon, Northamptonshire
†Linton, Rev. James . . .	. .	Hemingford, St. Ives, Huntingdonshire
Lipscomb, John	. .	Petersfield, Hampshire
Lismore, Viscount	11, Up. Belgrave-st.	Shanbally Castle, Clogheen, Ireland
Little, William Hunter . .	. .	Llanvair Grange, Abergavenny, Monm.
Littlewood, John	. .	Armthorpe, Doncaster, Yorkshire
Livesay, Thomas	. .	Hackney, Middlesex
Lloyd, Bell	. .	Corsygedol, Barmouth, Merionethshire
Lloyd, Cynnic	. .	Pontryfyth, Denbigh, North Wales
Lloyd, E. A.	14, Bedford-row	
Lloyd, L. F. Lloyd . . .	. .	Pontryfyth, Denbigh, North Wales
Lloyd, Llewellyn	. .	Pontryfyth, Denbigh, North Wales
Lloyd, Rev. Martin . . .	. .	Depden Rectory, Bury St. Edmund's
Lloyd, Rev. Thomas . . .	. .	Swayfield Rectory, N. Walsham, Norf.
Lloyd, Rev. Thomas J. . .	. .	North Wraxall, Chippenham, Wilts.
Lloyd, W.	. .	Aston, Oswestry, Salop.
Lock, George	. .	Oxford
Lock, George	. .	Blandford, Dorsetshire
Loft, William	. .	Trusthorpe, Alford, Lincolnshire
Long, Walter	29, Mill-street .	Preshaw House, Alton, Hampshire
Long, Walter J.	. .	Preshaw House, Alton, Hampshire
Longbourne, W. T. . . .	Gray's Inn . .	Enfield, Middlesex
†Longe, John	. .	Spixworth Park, Norwich
Longstaff, Charles		

Members.	Town Residence.	Country Residence.
Lord, C.	. .	Bridge Norton, Witney, Oxon.
Lord, Richard	. .	Hambleden, Henley-on-Thames, Oxon.
†Loud, Harry Finnes . . .	. .	Leybourne Castle, nr. Maidstone, Kent
Lousley, Job	. .	Hampstead-Norris, East Ilsley, Berks.
Lovesey, C. W.	. .	Charlton Kings, Cheltenham, Glouc.
Lowe, Charles	. .	Stamford, Lincolnshire
Lowndes, William . . .	. .	Brightwell, Tetsworth, Oxon.
Lucan, Earl of	. .	Laleham, Staines, Middlesex
Lucas, Joseph	. .	Rowsham, Aylesbury, Bucks.
Lugor, Elwood	. .	Hengrave, Bury St. Edmund's, Suffolk
Lumbert, R. C.	. .	Burghleigh Hill, Reading, Berks.
Lunn, Robert, jun. . . .	. .	Norton, Evesham, Worcestershire
Lush, Joseph	. .	Kilmington, Bruton, Somersetshire
Lyne, William	. .	Kingham, Chipping-Norton, Oxon.
†Lyon, James Wittit . . .	39, Belgrave-sq. .	Miserdine Park, near Cirencester, Glouc.
Mabbott, William Courthop .	. .	Lewes, Sussex
Macbride, David, D.C.L. .	. .	Oxford
Macdonald, Alexander . .	9, Hyde Park-st.	
†Mackenzie, Sir Francis A., Bt.	60, Lombard-street	Cowan House, Dingwall, Ross-shire, NB.
Maclaine, Colonel		
Macnamara, A.	. .	Langoed Castle, Brecknock
Macneill, Forbes	. .	Grove Lodge, Hayes, Middlesex
Maitland, F. C.	Mincing-lane	Henley-on-Thames, Oxon.
†Mainwaring, Townshend . .	. .	Marchiviel Hall, Wrexham, Denbigh.
Major, Stephen	. .	Stanhorn Green, nr. Hungerford, Berks.
Malins, Daniel	. .	Brackley, Northamptonshire
Mallam, Thomas	. .	Oxford
Malloch, C. Herbert . . .	. .	Chelston House, Torre, Devon.
Maltby, Edward Harvey .	11, Paper-bds. Temp	
Manby, Capt. Geo. W., F.R.S.	. .	Yarmouth, Norfolk
Mangles, F.	. .	Down Farm, Compton, Guildford
Manning, F.	. .	Bredfield House, Woodbridge, Suffolk
Manning, John	. .	Harpole, near Northampton
†March, Earl of	51, Portland-place	Goodwood Park, Chichester, Sussex
Marchant, Jonathan . . .	24, Wellington-ter.	
Marden, William, Jun. . .	. .	Gerpens, Rainham, Essex
†Margetts, Charles . . .	. .	Huntingdon
Margetts, William.	. .	Woodstock, Oxfordshire
Marlborough, Duke of . .	9, Albemarle-st. .	Blenheim Park, Woodstock, Oxon.
Marmont, James	. .	Bristol
Marriott, Rev. George . .	. .	Kemberton Rectory, Shiffnal, Salop.
Marsh, Isaac	. .	Beetley, near Dereham, Norfolk
Marsh, John	32, Bucklersbury	
Marshall, Captain Henry . .	4, Upp. Eaton-st.	
Marshall, John	. .	Eden Lodge, Beckenham, Kent
Marshall, Thomas . . .	. .	Chapel, near Colchester, Essex
Marshall, Thomas Gould . .	. .	Harvington Lodge, Evesham, Worces.
Marshall, William, M.P. . .	41, Upp. Grov.-st.	Patterdale Hall, Carlisle, Cumberland
Marshall, William	. .	Hurstperpoint, Brighton, Sussex
Marsham, Charles W. . . .	. .	Stratton Strawless, near Norwich
Marsham, Robert, D.C.L. .	. .	Merton College, Oxford
Marsham, Robert	. .	Stratton Strawless, near Norwich
Martin, Edward Wenman . .	33, Eaton-place	Brickwood House, Croydon, Surrey
Martin, Henry Burgess . .	. .	Colston Hall, Bingham, Nottinghams.
Martin, Robert	. .	Asterby, Horncastle, Lincolnshire
Martin, Thomas	. .	Ashton Underhill, Gloucestershire
Martin, Thomas	. .	Hextle House, East Peckham, Kent
†Mason, C. A.	. .	Farrinton, Ledbury, Hereford

Members.	Town Residence.	Country Residence.
Mason, Ibot	. .	Somersham, St. Ives, Huntingdonshire
Mason, John	. .	Wornsditch Farm, Kimbolton, Hunts.
Massingberd, Rev. Algernon	. .	Gunby Park, Spilsby, Lincolnshire
Massop, John		
Masters, Joseph	. .	Witney, Oxfordshire
Masters, Robert	. .	Weedonbeck, Northamptonshire
Mathews, Isaac	. .	Marlston, Newbury, Berks.
†Mathews, Jeremiah	. .	Park Hall, Kidderminster, Worcestersh
Mathews, Philip	. .	Burton, near Ross, Herefordshire
Maton, James	. .	Collingbourne, Pewsey, Wilts.
Matson, Charles	. .	Baddow Park, Chelmsford, Essex
Matson, Edward, jun.	. .	Long Hedge House, Battersea Fields
Matson, John	. .	Eastchurch, Isle of Sheppey, Kent
Matson, Robert	. .	Wingham, Kent
Matthew, John		
Matthews, John	. .	Oxford
Matthews, John	. .	Hungerford, Berks.
Matthews, Peter	. .	Elkstone, Cirencester, Gloucestershire
Matthews, Stephen	. .	Lidiard, Swindon, Wiltshire
Maugham, John	. .	Jerveaux Abbey, Bedale, Yorkshire
Mauleverer, William	. .	Arncliffe Hall, Cleveland, Yorkshire
Maw, George	. .	Walk House Barrow, Lincolnshire
Mawclark, William	. .	Strood, Rochester, Kent
Maxwell, William Constable	. .	Everingham Park, Pocklington, Yorks.
May, Charles	. .	Ipswich, Suffolk
Maydwell, Daniel	. .	Leatherhead, Surrey
Mayhew, Joseph	. .	Petmarsh, Essex
Mayne, John Thomas, F.R.S.	. Temple .	Teffont House, Salisbury, Wilts,
Medley, W.	2,Stnhpe-ter, H.pk.	
Mellor, James	. .	Shiffnal, Salop.
Menteath, Sir Chas. G. S., Bt.	. .	Closeburn Hall, Dumfries, N. B.
†Metcalfe, Charles James, Jun.	. .	Roxton House, St. Neot's, Huntingdons.
Michell, Edward	. .	Steyning, Sussex
Middleton, Captain	. .	Leasingham, Sleaford, Linc.
Milden, T.	. .	Brinnington Hill, Warwick
Mildmay, P. St. John, M.P.	9, Berkley-square	Hasle Grove House, Sherborne, Dorset.
Miller, Rev. M. H.	. .	Scarborough, Yorkshire
Miller, William	. .	Watereaton, near Oxford
Millington, Bryan	. .	Asgarby, Sleaford, Lincolnshire
Mills, C. S.	. .	Newbury, Berkshire
Mills, Rev. William	. .	Shellingford, Faringdon, Berks.
Mills, John	. .	Ulceby Barton, Lincolnshire
†Milne, Alexander	Whitehall	
Milnes, John L.	24,Holles-st.Cav-sq	Hilgay Lodge, Downham Market, Norf.
Milnes, R. Monckton, M.P.	26, Pall Mall	Fryston Hall, Pontefract, Yorkshire
Minet, Charles William	. .	Brasted, Sevenoaks, Kent
Mitchell, James Henry	17, UpWimpole-st.	
Monck, J. B.	. .	Coley Park, Reading, Berks.
Monckton, G.	. .	Stretton, Wolverhampton, Staffordshire
Montefiore, J. B.	16,Geo-st.Mans-ho	
Montgomerie, C. M.	. .	Garboldisham Hall, Harling, Norfolk
Montgomery, T. M.	Eaton-pl, Belg.-sq.	Garboldisham Park, Norfolk
Moody, C. A.	. .	Kingsdown, Ilchester, Somersetshire
Moor, Major Edward, F.R.S.	. .	Bealings, Woodbridge, Suffolk
Moore, George	. .	Banbury, Oxfordshire
Moore, George F.	. .	Perth, Swan River, Australia
Mordaunt, Rev. C.	. .	Badgworth Cross, Axbridge, Somerset.
Morewood, Colonel Palmer	. .	Alfreton Hall, Derbyshire
Morgan, George	. .	Biddlesden Park, Brackley, Northamps
Morgan, Robert	41, West Smithfld.	

Members.	Town Residence.	Country Residence.
Morland, George Bowes	. .	Abingdon, Berkshire
Morley, Earl of	Kent Ho, Knightsb	Saltram, Plymouth, Devon.
Morrell, Frederick J.	. .	Oxford
Morrell, James, Jun.	. .	Headington Hill, Oxford
Morrell, Mark T.	. .	Oxford
Morton, Henry	. .	Denham, Buckinghamshire
Morton, John Chalmers	. .	Chester Hill, Stroud, Gloucestershire
Moseley, Charles	. .	Ely, Cambridgeshire
Mount, Thomas	. .	Saltwood, Hythe, Kent
Mount, William	. .	Wasing-place, Newbury, Berkshire
Mountford, J.	. .	Barrows Farm, Lambourn, Berkshire
Mumford, George	. .	Downham-Market, Norfolk
Mules, William	. .	The Grove, Colchester, Essex
Mumford, George	. .	Little Cornard, Sudbury, Suffolk
Munday, S.	. .	Abingdon, Berkshire
Mundy, H.	. .	Andover, Hampshire
Mundy, J.	. .	Culham, Abingdon, Berks.
Munton, W.	. .	Banbury, Oxon.
Murray, John	Albemarle-street	
Muscott, John	. .	Bury of Weston, near Pembridge, Heref.
Musgrave, Sir George	. .	Edenhall, Penrith, Cumberland
Mushet, James	. .	Lambsquay Farm, Dean Forest, Glouc.
Muskett, Charles	. .	Roydon, Diss, Norfolk
Muskett, Charles	. .	Farsfield Hall, Diss, Norfolk
Muskett, John	. .	Fornham, Bury St. Edmund's, Suffolk
Myddleton, R. W.	. .	Leasingham, near Sleaford, Linc.
Myers, John Dyneley	. .	Langford, Lechlade, Gloucestershire
Myers, Thomas	. .	Langford, Lechlade, Gloucestershire
Nalder, John	. .	Northmoor, near Oxford
Nash, Charles	. .	Royston, Hertfordshire
Nash, John	. .	Reigate, Surrey
Nash, Joseph	. .	Reigate, Surrey
Nash, Peter	. .	Great Chesterford, Cambridgeshire
Nash, Rev. R. A.	. .	Hamerton, Huntingdonshire
Nash, Thomas	. .	Carlton Grange, Newmarket, Cambr.
Nash, Thomas, Jun.	. .	Chesham, Bucks.
Nash, Thomas Foulmore	. .	Royston, Cambridgeshire
Nash, William	. .	Langley, Colnbrook, Bucks.
Nash, Wedd William	. .	Royston, Cambridgeshire
Neale, Stephen.	. .	Tytherington, Warminster, Wiltshire
Neale, H. St. John	. .	Ringwood, Hampshire
Neame, Charles	. .	Selling, Faversham, Kent
Neame, Frederick	. .	Selling, Faversham, Kent
Neame, John	. .	Selling, Faversham, Kent
Neame, Thomas	. .	Canterbury, Kent
Neave, Sheffield	6, Albemarle-st.	
Neeld, John, M.P.	6, Grosvenor-squr.	Red Lodge, Cricklade, Wiltshire
Neeve, J.		
Nelson, Rev. J.	. .	Childrey, Wantage, Berkshire
Neve, John.	. .	Tenterden, Kent
Neve, Thomas	. .	Benenden, Cranbrook, Kent
Nevill, Viscount	. .	Nevill Park, Tunbridge Wells, Kent
Newdigate, C. N.	. .	Asbery, Coventry, Warwickshire
Newman, Charles	. .	Court Farm, Hayes, Southall, Middlesex
Newnham, Henry	. .	Silchester, Bungalow, Basingstoke, Hants
Newton, Marcellus	. .	Wareham, Hereford
Newton, M.	. .	Wareham, Hereford
Newton, Richard	. .	Britwell, Watlington, Oxon.

Members.	Town Residence.	Country Residence.
Niblett, D. J.	. .	Haresfield, Stroud, Gloucestershire
Nicholson, William Henry	1, Robert-st., Adel.	Upnor, Rochester, Kent
Nicholson, Brady	. .	Wootton Barrow, Lincolnshire
Nicklin, Richard	. .	Tipton, near Birmingham, Warwicksh.
†Nightingale, W. E.	. .	Embley, near Romsey, Hants.
Nix, William	. .	Somersham, Huntingdonshire
Noakes, T.	. .	Warncocks, near Eastbourne, Sussex
Nockolds, Martin	. .	Saffron-Walden, Essex
Norreys, Lord, M.P.	40, Grosvenor-sq.	Wytham Abbey, near Oxford
Norris, William John	. .	Radwell House, Baldock, Herts.
North, Frederick	. .	Rougham, Swaffham, Norfolk
North, Lieut.-Col.	. .	Wroxton Abbey, Banbury, Oxon.
Northcote, Henry Stafford	University Club	Pyne's, Exeter, Devonshire
Northeast, Thomas	University Club	Tedworth, near Andover, Hants.
Northey, Edward Richard	. .	Epsom, Surrey
Northhouse, William Spencer	2, Storey's Gate	
Nott, John		
Noyes, Finch	. .	Laverstock Hall, Salisbury, Wilts.
Noyes, Thomas H.		
Nutter, James	. .	Cambridge
Oakley, Thomas	. .	Water End Farm, Sandridge, St. Alban's
Oakley, John	. .	Larkin Hall, Frindsbury, Rochester, Kt.
O'Brien, Stafford	. .	Blatherwick Park, Stamford, Lincolns.
Ogilvy, Sir John, Bart.	. .	Baldovan House, near Dundee, N. B.
Ogle, Henry	. .	Eastbourne, Sussex
Oldham, Thomas	. .	Saltfleetby, Louth, Lincolnshire
Oliver, William	Covent Garden	New Cross, Deptford, Kent
Oliver, John	. .	Abingdon, Berkshire
Oliver, W.	. .	Courtlands, Arundel, Sussex
†Oliverson, Richard	14, Portland-place	
Oliver, James	. .	Handford, Blandford, Dorset.
Onley, Charles Savill, F.R.S.	Grt. Geo.-st. West.	Stisted Hall, Braintree, Essex
Onley, Onley Savill	. .	Stisted Hall, Braintree, Essex
Orlebar, R. Lonquet	. .	Hinwick Ho., Wellingborough, Northam.
Ormond, William	. .	Wantage, Berkshire
Osbiston, Samuel	. .	East Rainham, Norfolk
Osborne, Charles	. .	Hayling, Emsworth, Hampshire
Osborne, Martin	. .	St. Ives, Huntingdonshire
Overman, C. E.	. .	Burnham Westgate, Norfolk
Overman, T. W.	. .	Maulden, Ampthill, Bedfordshire
Overman, John	. .	Burnham Sutton, Burnham Westg. Norf.
Overman, Henry	. .	Weasenham, Fakenham, Norfolk
Owen, Thomas	. .	Kentbury, Newbury, Berks.
Packe, Colonel H.	. .	Twyford Hall, Guist, Norfolk
Padwick, Frederick	. .	West Thorney, Chichester, Sussex
Pagden, J.	. .	Eastbourne, Sussex
Paget, Arthur	. .	Thorpe Satchville, Melt. Mowbray, Leic.
Paget, George	. .	Sutton Bonington, Kegworth, Leic.
Paget, Charles	. .	Ruddington Grange, near Nottingham
Paget, Henry	. .	Birstall, Leicestershire
Paicey, Robert	. .	Chedgelow, Tetbury, Gloucestershire
Pain, Philip	. .	Boughton House, Kettering, Northamp.
Paley, William Frankland	. .	Gladdon, near Leeds, Yorkshire
Palmer, Ellis	. .	Caston, Watton, Norfolk
Palmer, George, M.P.	11, King's Arms yd.	Nazing Park, Waltham Abbey, Essex
Palmer, William	. .	East-Garston, Lambourn, Berks.

Members.	Town Residence.	Country Residence.
Palmer, Henry	. .	Brightwaltham, Berkshire
Palmer, John	. .	Hearn, Kent
Papillon, Thomas	. .	Maydeacon, Canterbury, Kent
Parham, William	. .	Sutton-Veny, Warminster, Wilts.
Park, Rev. Waldegrave	. .	Ince Hall, Cheshire
Parker, Thomas A. W., M.P.	9, Conduit-street	Ensham Hall, Witney, Oxfordshire
Parker, Christopher C.	. .	Woodham-Mortimer, Maldon, Essex
Parker, Rev. E.	. .	Bicester, Oxfordshire
Parker, Henry	. .	Fairford, Gloucestershire
Parker, Adm. Sir Hyde, Bart.	. .	Melford Hall, Long Melford, Suffolk
Parker, Oxley	. .	Woodham-Mortimer, Maldon, Essex
Parker, Thomas W.	. .	Henley-on-Thames, Oxfordshire
Parker, William	. .	Oxford
Parker, William		
Parkes, J. W. H.		
Parker, Rev. W. H.	. .	Saham Rectory, Watton, Norfolk
Parkhurst, W.	. .	Dartford, Kent
Parkinson, John	. .	Leyfields, Ollerton, Notts.
Parkinson, Richard	. .	Muskham Villa, Newark, Notts.
Parratt, Hillebrant Meredith	. .	Effingham House, Leatherhead, Surrey
Parrott, G.	. .	Oxford
Parrott, J.	. .	Somers Town, near Oxford
Parry, Samuel	. .	Clanes, near Worcester
Parry, G. F.	. .	Duisk Lodge, Ayrshire.
Parsons, John	. .	Oxford
Parsons, George	. .	West Lambrook, South Petherton, Som.
Parsons, J. M.	6Raym.Bgs.Gry'sI	
Parsons, James	. .	Stoneham, Southampton, Hants.
Parsons, William, jun.	. .	Wilnecote, Tamworth, Warwickshire
Partridge, Henry Samuel	. .	Hockham Hall, East Harling, Norfolk
Partridge, W. Champion	. .	Snare Hill, Thetford, Norfolk
Passand, Rev. J.	. .	Shipton Charwell, Woodstock, Oxon.
Passmore, Edward	. .	Wraysbury, Staines, Bucks.
Patterson, George	. .	Poyle House, Colnbrook, Bucks.
†Patterson, W. J.	. .	Durnford Lodge, Wimbledon, Surrey
Paul, William	. .	Pentney, Lynn, Norfolk
Paull, Matthew	. .	Compton-Paunceford, Wincanton, Som.
Paxton, William	. .	Langford Farm, Bicester, Oxon.
Payne, W.	. .	Wixoe, near Clare, Suffolk
Payn, William	. .	Kidwells, Maidenhead, Berkshire
Payne, J. Augustus	. .	Quy, Cambridgeshire
Peacock, John A.	. .	Osbourn, Folkingham, Lincolnshire
Peacock, A.	. .	Rauceby, Sleaford, Lincolnshire
Peacock, Thomas	. .	Bishop Auckland, Durham
Peacock, Wilkinson	. .	Thorpe, Tilvey, Sleaford, Lincolnshire
Pearce, R. M.	. .	Hill Farm, Hook Norton, Banbury, Oxon.
Pearce, S.	. .	Ruislip Manor Farm, Uxbridge, Middx.
Pearse, George	. .	Harlington, Ampthill, Bedfordshire
Peel, Bolton	. .	Purley, near Reading, Berkshire
Peel, Rev. F.	. .	Culham, Abingdon, Berkshire
Peel, J.	. .	Culham, Abingdon, Berkshire
Peel, Jonathan	. .	Willingham, Lincolnshire
Peel, William	. .	Culham, Abingdon, Berkshire
Peers, Charles	. .	Chislehampton, near Oxford
Pell, Paul Francis	. .	Tupholme Hall, nr Wragby, Lincolnsh.
†Pell, Sir W. Owen	. .	Synell Hall, Northamptonshire
Pell, Edwin	. .	Synell Hall, Northamptonshire
Peel, Rev. Frederick	. .	Willingham, Gainsborough, Lincolnshr.
Peel, Jonathan	. .	Culham, Abingdon, Berkshire
Pemberton, Christopher	. .	Trumpington Street, Cambridge

Members.	Town Residence.	Country Residence.
Penfold, Hugh	. .	Annington, Steyning, Sussex
†Penn, Granville J.	. .	Stoke Park, Colnbrook, Bucks.
Penoyre, Rev. L.	. .	The Moor, Hay, Herefordshire
Penson, Thomas	. .	Foscott, Oxford
Peppercorne, Henry	. .	Aylesford, Maidstone, Kent
†Percival, John, jun.	Albion Club	Northampton
Percival, Thomas	. .	Wansford, Northamptonshire
Perkins, Frederick	. .	Chipstead-place, Sevenoaks, Kent
Perkins, Joseph	. .	Laughton, Market-Harborough, Leices.
Perkins, Thomas	. .	Willesborough Court, Ashford, Kent
Perkins, W.	. .	Haine, St. Lawrence
Perry, G. W.		
Peters, John Weston	. .	South-Petherton, Somerset.
Pett, W.	. .	Minster Thanet, Kent
Peyton, Henry		
†Philips, J. Burton	10, Park Crescent	
†Philips, Sir George, Bart.	. .	Weston House, Chipping Norton, Oxon.
†Philips, George Richard, M.P.	12, Hill-st., Berk-sq.	
Phillimore, Robert	. .	Newberries, St. Alban's, Herts.
Phillipps, James	. .	Bryngwyn, near Ross, Herefordshire
Phillips, John	. .	Culham, Abingdon, Berkshire
Phillips, John	. .	Charnage Farm, Mere, Wilts.
Phillips, Joseph	. .	Ardington, Wantage, Berks.
Phillips, Richard	. .	Brockton Grange, Shiffnal, Salop.
Phillips, Sir Thomas, Knt.	17, Wimpole-street	Newport, Monmouthshire
Phillpotts, Rev. T.	. .	Gwennap, Cornwall
Phipps, John	. .	River, near Dover, Kent
Phipps, Thomas Hele, Jun.	. .	Leighton House, Westbury, Wilts.
Pickering, Leonard	. .	Welcot, Witney, Oxfordshire
Pickin, William John	. .	Whitemoor, Ollerton, Notts.
Pickworth, John	. .	Kirkby Lathorpe, Sleaford, Linc.
Pigot, Grenville	. .	Doddershal House, Aylesbury, Bucks.
Pilcher, Charles	. .	Oxford
Pilcher, Jesse	. .	Cheriton Court, Sandgate, Kent
Pillans, William		
Pinckard, John Thomas	. .	Handley, Towcester, Northamptonshire
Pinkney, Rev. D.	. .	East Sheen, Richmond, Surrey
Pinfold, Charles	. .	Twine, Surrey
Pinfold, John	. .	Oxford
Pinney, William, M.P.	30, Berkeley-sq.	The Park, Somerton, Somersetshire
Pinnix, J. A.		West Dean, Chichester, Sussex
Pinnock, Rev. George	. .	Wyre, near Pershore, Worcestershire
Pinnock, Rev. H.	. .	Moroah, Penzance, Cornwall
Platt, George Edward	. .	Denne Park, Horsham, Sussex
Platt, John Clarke	22, Ludgate-street	
Plestow, C. Berners	. .	Wattington Hall, Downham, Norfolk
Plummer, James	. .	Ensham, near Oxford
Plummer, John	. .	Siddington, Cirencester, Gloucestershire
Pocock, Charles	. .	Sulham, Reading, Berkshire
Pocock, J. Hall	. .	Bothamsted, East Ilsley, Berks.
Poittevin, J. H. J.	20, Panton-st. Hay.	
Polhill, William	. .	Eyford, Stow, Gloucestershire
Poole, Edward	. .	Hornend, Ledbury, Herefordshire
Pope, Edward	. .	Frampton, Dorchester, Dorset.
Poppy, Charles	. .	Witnisham, near Ipswich
Porter, Edward	. .	Moor Critchill, Wimborne, Dorset.
Porter, William	. .	Hembury Fort, Honiton, Devon.
Potter, R.	. .	Lydden Court, Dover, Kent
Potterton, J. Faulkner	. .	Stowe, Weeden, Northamptonshire
†Powell, Alexander	. .	Hurdcott House, Wiltshire

Members.	Town Residence.	Country Residence.
Powell, George		Boston Road, Brentford, Middlesex
Powell, W.		Marcham, Abingdon, Berks.
Powell, William		Egbros Nunydd, Margan, Glamorgansh.
Pownall, Henry		Spring Grove, Isleworth, Middlesex
Powys, Henry P.		Hardwicke House, Oxford
Pratt, Edward		Candwell, Burton-on-Trent, Staffs.
Pratt, Sampson		Bruern Abbey, Oxford
Pratt, William		Newfield, Southam, Warwickshire
Pressly, Charles	Somerset House	
Pretyman, Rev. R.		
Price, Thomas		Gaer, near Brecon, S. W.
Price, H.		
Price, Henry		Heriotts, Hartlip, Sittingbourne, Kent
Price, Rev. Ralph		Rectory, Lyminge Elham, nr Canterbury
Priday, W.		Newent, Gloucestershire
Pridgold, H.		
Princep, W.		Newton, near Tamworth, Staffordshire
Procter, Thomas		Bristol
Pryme, George, M.P.		Cambridge
Pullen, Stephen, Jun.		Hater, Colnbrook, Bucks.
Punnet, Rev. J.		St. Gotta, Cornwall
Purchas, R. W.		Pilstone, near Monmouth
Purratt, John		Moins Farm, near St. Alban's, Herts.
Purser, John		Willington, near Bedford
Putland, John		Firle Place Farm, Lewes, Sussex
Quantrill, J.		Southampton, Hants.
Quarrell, Thomas		Crossthorne, Worcestershire
Ramsay, J	9 Endsleigh st Tav S	
Randall, Richard		Tunbridge Wells, Kent
Randolph, Rev. Charles		Kimpton Lodge, Andover, Hants.
Ransome, James		Ipswich, Suffolk
Ransome, Robert		Ipswich, Suffolk
Ransome, James Allen		Yoxford, nr Ipswich, Suffolk
Rason, William		Eastbourne, Sussex
Ravenhill, John		Warminster, Wiltshire
Rawlence, George Curtis		Parsonage, Fordingbridge, Hants.
Rawlinson, A. T.		Chadlington, Chipping-Norton, Oxon.
Raynbird, Robert		Hengrave, Bury St. Edmund's, Suffolk
Rayner, W		Ely, Cambridgeshire
Rayston, Robert		Stockton-on-Tees, Durham
Reay, John, Jun.		East Dulwich, Surrey
†Rebow, Gurdon		Wivenhoe Park, Colchester, Essex
Rendlesham, Lord		Rendlesham House, Wickham-Mk. Suff.
Rham, Rev. W. L., M.A.		Winkfield Vicarage, Bracknell, Berks.
Rhodes, J. A.		Horsforth Hall, Leeds, Yorkshire
Rice, James		Cotton End, Northamptonshire
Rice, Edward Royd, M.P.	16, Suffolk-street	Dane Court, near Wingham, Kent
Rich, E. W.		Didmarton, Tetbury, Gloucestershire
Richards, James		Dumbleton, Evesham, Worc.
Richards, Rev. Thomas		Aberystwith, Cardiganshire
Richardson, William		Great Limber, Lincolnshire
Ricketts, Henry J.		The Grove, Brislington, nr Bristol, Som.
Riddell, Edward		Cheeseburn Grange, Newcast.-on-Tyne
Ridge, William		Stoneham, Lewes, Sussex
Ridgway, James	169, Piccadilly	
Riddick, William		Cirencester, Gloucestershire

Members.	Town Residence.	Country Residence.
Ridley, Rev. Charles John .	. .	University College, Oxford
Rigg, Robert, F.R.S. . . .	2, Chatham-place	Walworth Road, Surrey
Risley, Rev. W. C. . . .	. .	Deddington, Oxfordshire
†River, John		
Roberts, J.		
Roberts, John L.	. .	Ditchley, Sussex
Roberts, Joseph	. .	Waterperry, near Oxford
Roberts, Robert	. .	Rauceby, Horncastle, Lincolnshire
Roberts, J.		
Roberts, W. C. Cramer . .	. .	Sally Mount, Killcullen, Ireland
Robertson, Daniel	13, Austin Friars	
Robins, R. B.	. .	East Lavant, nr Chichester, Sussex
Robins, Henry	. .	Asps, near Warwick
Robinson, Rev. Sir George, Bt.	. .	Cranford, Kettering, Northamptonshire
Robinson, John	. .	Whittington, Litchfield, Staffs.
Robinson, Michael	. .	Heston, Hounslow, Middlesex
Robinson, Thomas	. .	Oxford
Robinson, William . . .	. .	Albion Place, Hemel-Hempstead, Herts.
Robinson William	. .	Bletsoe, near Bedford
Robinson, William . . .	. .	Bonehill, Tamworth, Staffs.
Rodd, F. H.	. .	Trebartha Hall, Launceston, Cornwall
Roden, George	. .	Sutton Maddock, Shiffnal, Salop.
Rodwell, Joshua	. .	Alderton, Woodbridge, Suffolk
Rodwell, William	. .	Ipswich, Suffolk
Roe, Henry R.	. .	Graton Hall, Yealmpton, Devonshire
Rogers, H.	. .	Boston, Lincolnshire
Rogers, John	. .	Melchbourn, Bedfordshire
Rogerson, John.	. .	Camden Cottages, Camden Town
Rolfe, John	. .	Beaconsfield, Buckinghamshire
Rolls, John E. W. . . .	. .	The Hendre, near Monmouth
Romilly, Edward	Audit-off, Som. Ho.	
†Rooper, J. Bonfoy	. .	Abbotts Ripton, Huntingdonshire
Round, Charles Grey, M.P. .	102, Regent-street	Birch Hall, Colchester, Essex
Round, John, M.P. . . .	. .	Danbury Park, Chelmsford, Essex
Rowland, Richard	. .	Creslow, Buckinghamshire
Rowland, William. . . .	. .	Water Eaton, near Oxford
Rowles, Charles.	. .	Ledwell Farm, Woodstock, Oxon.
Rowley, R. C.	. .	Holberks, Hadleigh, Suffolk
Royle, J. Forbes, M.D, Prof. K.C.	East India House	
Ruck, Edmund		
Rumbold, Charles E., M.P. .	. .	Preston Candover, Basingstoke, Hants.
Rusbridger, George . . .	. .	Goodwood, Chichester, Sussex
Rusbridger, John	. .	Goodwood, Chichester, Sussex
†Russell, Lord Chas. J. F., M.P.	6, Belgrave-square	Drakeloe Lodge, Woburn, Bedfordshire
Russell, G. Lake	. .	Southill Park, Bracknell, Berks.
Russell, Thomas A. . . .	. .	Cheshunt Park, Waltham Cross, Herts.
Ryde, Henry Thomas . . .	. .	Aylesbury, Buckinghamshire
Rylatt, W	. .	Branswell, Sleaford, Lincolnshire
Sadler, Henry	. .	Mid-Lavant, Chichester, Sussex
St. John, Lord	. .	Melchbourn, Higham Ferrers, Northam.
†St. Alban's, Duke of . . .	80, Piccadilly. .	Redbourne Hall, Brigg, Lincolnshire
Salmon, George	. .	Trumpington Road, Cambridge
Salomons, David	. .	Broom Hill, Tonbridge, Kent
Salter, George	. .	Crewkerne, Somersetshire
Salter, T. F.	. .	Great Hallingbury, Essex
Salter, Thomas	. .	Attleborough, Norfolk
Sampson, Arthur	. .	Drummond Ballykelly, Derry, Ireland
Sampson, John	. .	Brympton, near Yeovil, Somerset.

Members.	Town Residence.	Country Residence.
Sampson, Benjamin		Tulley Main, nr Truro, Cornwall
Sanctuary, Thomas		Worthing, Sussex
Sanders, Henry		Harlestone, nr Northampton
Sanderson, James Martin		Sunbury, Middlesex
Sandford, Mark		Martin, East Langdon, Dover, Kent
Sandham, Major		Rowdell, Shoreham, Sussex
Sandle, William		Wethersfield Place, Essex
Sandon, Lord	41, Grosvenor-st.	Norton House, Campden, Staffords.
Sandon, Samuel		North Hill, Biggleswade, Beds.
Sandwich, Earl of	Carlton Club	Hinchingbrooke House, Huntingdon
Sanford, W. A.	21, Queen-st., May-f	Nynehead Court, Wellington, Somerset.
Sanald, S.		
Sargeant, Edward		Stamford, Lincolnshire
Sargeaunt, Rev. John		Stanwick, Higham-Ferrers, Northamp.
Sarney, C.		Soundess, Nettlebed, Henley, Oxon.
Satterfield, Joshua		Green Heys, Manchester
Saunders, Randle W.		Nunwick Hall, Cumberland
Saunders, Samuel	6, Brompton-square	Upton Grove, Tetbury, Gloucestershire
†Saunders, Thomas Bush		Bradford, Wiltshire
Saville, G., Jun.		Cottesmore, Rutlandshire
Savill, Samuel		Bocking, Essex
Savours, William		Headington, Oxford
Sawbridge, Henry B.		East Haddon, Northampton
Sawtell, John		Crewkerne, Somersetshire
Say, John Goodal	3, Savage Gardens	Green Tey, Coggeshall, Essex
Scales, John		Helloughton, Lynn, Norfolk
Scarth, Jonathan		Shrewsbury, Salop.
Scobell, Capt. R.N.		High Littleton, Bath, Somersetshire
Scotson, Samuel		Toxteth Park, Liverpool, Lancashire
Scott, George Denistoun		Lovel Hill, Winkfield, Berks.
Scott, Thomas Edward		Carbrooke, Watton, Norfolk
Seabrook, William		Boreham, Essex
Seaman, R. C. P.	4, Up. Gower-st.	Rotherby, Leicestershire
Searle, Alfred		Cambridge
Searle, William		Cambridge
Seawell, Henry		Little Bookham, Surrey
Seawell, Thomas Samuel		Marelands, nr Farnham, Surrey
Sedgwick, W. Fellows		Pullingspit, Rickmansworth, Herts.
Selmes, Samuel		Beckley, Rye, Sussex
Senior, J. T.		Broughton House, Aylesbury, Bucks.
Seward, Samuel		Weston, Petersfield, Hants.
Sewell, Professor	Royal Veter. Collg.	
Sewell, Thomas Francis		Colne Engain, Essex
Shackel, George		Maple-Durham, Reading, Berks.
Shackel, W.		Mile House, Reading
Shafto, R. E. Duncombe		Whitworth Park, Rushyford, Durham
Sharp, William		Scarthing Moor, Tuxford, Notts.
Sharpe, James		Fawley Court Farm, Henley, Bucks.
Sharwood, Dendy	120, Aldersgate-st.	Clapton, Middlesex
Shaw, William, Jun.		Hemsbury Hill, Northampton
†Shawe, R. Fleetwood		Brantingham, Hull, Yorkshire
Shawe, R. N.		Kesgrave Hall, Woodbridge, Suffolk
Shawe, Samuel Pole		Hints Hall, Tamworth, Staffordshire
Sheen, Richard		Oxford
Sheepshanks, Archdeacon		Gluvias, Cornwall
Sheldon, Jonathan		Ensham, nr Oxford
Sheldon, William		Stanton St. John, Oxford
Sheldon, William		Stratford-upon-Avon, Warwickshire
Shepherd, Arthur		Shaw End, Kendal, Westmoreland
Sherborn, George		Ashford, nr Staines, Middlesex

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Members.	Town Residence.	Country Residence.
Sherborn, Francis	. .	Bedfont, Middlesex
Sherwood, J.	. .	Purley, near Reading, Berkshire
Sherwood, Richard	. .	Chaddleworth, near Wantage
†Sherratt, John Simpson	. .	Lichfield, Staffordshire
Shillito, Stephen	. .	Barow Hall, Bury St. Edmunds
Shittler, John	. .	Bradford Farm, Wimborne, Dorset.
Short, T.	. .	Martin, nr Bawtry, Notts.
Shrubb, James	. .	Dorchester, Oxfordshire
†Shubrick, Colonel	. .	The Grove, Leatherhead, Surrey
Shute, J.	. .	Frampton, Cothill, Bristol, Somerset.
Shuttleworth, Mark	. .	Tottenham, Middlesex
Silvertop, G.	. .	Minsteracres, Northumberland
Simeon, Sir Richard, Bart.	. .	Swainton, Isle of Wight
Simonds, James B.	. .	Twickenham, Middlesex
Simonds, W. Barrow	. .	St. Cross, near Winchester, Hants.
Simmons, James	. .	Sutton-Wick, near Abingdon, Berks.
Simpson, H. Bridgman, Jun.	1, Saville-row	Eaton, Retford, Notts.
†Simpson, Hon. John B.	. .	Babworth Hall, Retford, Notts.
Simpson, John	. .	Bardwell, Suffolk
Simpson, Richard	. .	Mellor Lodge, near Stockport, Lanc.
Sims, John		
Sitwell, Rev. H. W.	. .	Leamington-Hastings, Southam, Warw.
Skelton, Spencer	. .	Sutton Bridge, Wisbeach, Camb.
Skirving, William	. .	Queen Square, Liverpool
Skudamore, Lieut.-Colonel	. .	Kentchurch Court, Hereford
Skyrme, John	. .	Splot, Cardiff, Glamorganshire
Slack, Joseph Albin	46, Weym.-st. P.pl	Redbourne House, St. Alban's, Herts.
Slapp, Rev. Thomas Peyton	. .	Old Buckenham Ldg, Attleburgh, Nfk.
Slark, William	155, Piccadilly	
Slater, John J., Jun.	. .	Haslebeech, Northamptonshire
Slator, Frederick	. .	Vetham, Canterbury
Slatter, William	. .	Stratton, nr. Cirencester, Gloucestershire
Small, Henry	. .	Barfoot Farm, Wimborne, Dorset.
Smallbones, Richard H.	. .	Hordley, Woodstock, Oxfordshire
Smart, William	. .	Rainham, Rochester, Kent
Smith, Alexander	. .	Cirencester, Gloucestershire
Smith, Charles Brent	. .	Whaddon, Stroud, Gloucestershire
Smith, Charles Culling	22, Arlington-st.	
Smith, Sir Culling Eardley, Bt.	. .	Bedwell Park, near Hatfield, Herts.
Smith, Elliot J.	. .	Cambridge
Smith, F.	. .	Hales Owen Grange, Birmingham
Smith, G.	. .	Polton, Biggleswade, Beds.
Smith, G.	. .	Tewkesbury, Gloucestershire
Smith, Henry	. .	Drax Abbey, York
Smith, Henry	. .	Heywood Fm, W. Waltham, Maidenhd.
Smith, J.	. .	Coton, near Northampton
†Smith, J. James	. .	Down House, Blandford, Dorset.
Smith, J. Hogan	. .	Forberry Grove, near Newbury, Berks.
Smith, J. P.	. .	Lower Wick House, near Worcester
Smith, James	. .	Stansted, near Chichester, Sussex
Smith, Sir John Wyldbore, Bt.	. .	Down House, Blandford, Dorset.
Smith, Joseph	. .	Chatteris, Cambridgeshire
Smith, Robert	. .	Bingley-on-the-Hill, Oakham, Rutland
Smith, Robert	. .	Heath Farm, St. Alban's, Herts.
Smith, T. Nicklin	. .	Austry, near Tamworth, Staffs.
Smith, W.	. .	Rushford, Alcester, Warwickshire
Smith, W.	. .	West Rasen, Spital, Lincolnshire
Smith, William	. .	Hemel-Hempstead, Herts.
Smithe, R.	. .	Eastling, Faversham, Kent
Smyth, George		

Members.	Town Residence.	Country Residence.
Smythies, Carleton	. .	Eye, Suffolk
Smythies, Rev. John Robert .	. .	Lynch Court, nr. Leominster, Hereford.
Snibson, Richard	. .	Bakewell, Derbyshire
Snell, John	. .	Hundon, near Clare, Suffolk
Snow, Benjamin	. .	Sleaford, Lincolnshire
Snow, Johnson	. .	Ewerby, near Sleaford, Lincolnshire
Snowden, Rev. C. C.	. .	
Solly, Samuel, F.R.S.	48, Upp. Gower-st.	Morton Woodlands, near Lincoln
Solly, Samuel Reynolds, F.R S.	. .	Serge Hill, St. Alban's, Herts.
Somes, Samuel	. .	Wollaston, nr. Wellingboro', Northam.
Souhter, George	. .	Box Grove, near Chichester, Sussex
Sparks, William	. .	Crewkerne, Somerset.
Sparks, J.	. .	Loseley, Guildford, Surrey
Speakman, Robert	. .	Oxford
Spearman, J.	. .	Newton Hall, Durham
†Spencer, Hon. Capt., M.P. .	. .	Althorp Park, near Northampton
Spencer, William	. .	Adderbury, nr. Woodstock, Oxfordshire
†Spencer, Hon. F.	6, King-st. St. James	
Spicer, Thomas	. .	Bockhampton, Lambourne, Berks.
Spicer, John William	8, Hanover-square	Esher-place, Esher, Surrey
Spong, Ambrose	. .	Manor Farm, Frindsbury, Rochester
Spooner, Professor Charles .	Royal Vet. College	
Spooner, Richard	. .	Worcester
Stace, J.	. .	Berwick, Sussex
Stacey, William	. .	Burton Farm, Abingdon, Berks.
Stallard, Joseph	. .	Redmarley, Stroud, Gloucestershire
Stane, Rev. John Bramston .	. .	Forest Hall, Ongar, Essex
Stanier, Edward	. .	Wroxeter, Shrewsbury, Salop.
Stanier, John	. .	Leaton, near Wellington, Salop.
Stanley, Edward	14, Grosvenor-sq. .	
Staples, John	. .	Highlands, near Dartford, Kent
Starling, Robert	13, Norf.-st., Islin.	
Starr, John	. .	Eastbourne, Sussex
Stead, W. Pitt	. .	Woodley House, Romsey, Hants.
Stedman, Edward	. .	High Ercal, Wellington, Salop.
Stedman, Gill	. .	Pakenham, Suffolk
Steele, Henry Perin, R.N. .	36, Dover-street .	Beaminster, Dorsetshire
Steele, John	. .	Epsom, Surrey
Steele, Sir Robert	36, Dover-street .	Meerhay, Dorsetshire
Steele, William	. .	Abergavenny, Monmouthshire
Stent, Matthew	. .	Cranford, Middlesex
Stephens, John	. .	Caversham Rise, Reading, Berks.
Stephens, William.	. .	Prospect Hill, Reading, Berks.
†Steuart, Robert, M.P. . . .	. .	Alderston, Haddingtonshire
Stevens, Thomas	. .	Atherton, Ilminster, Somersetshire
Stevenson, J. G.	. .	Skellingthorpe, Lincoln.
Stokes, Charles	. .	Kingston, Keyworth, Notts.
Stokes, Charles Staples . .	. .	Murrell's End, Gloucester
Stokes, Frederick	. .	Woodfields, Ross, Herefordshire
Stokes, J. Allen	. .	Harvington, nr Evesham, Worcestershire
Stokes, John	. .	Pauntley Court, near Newent, Glouc.
Stone, George	. .	Fyfield Wick, near Abingdon, Berkshire
Stone, Mark	. .	Fyfield Wick, near Abingdon, Berkshire
Stone, W.	. .	Streatley House, Reading, Berks.
Stone, W. F. Lowndes . .	. .	Brightwell, near Watlington, Oxon.
Storey, A. Mervin R., F.R.S. .	86, Jermyn-street .	Basset Down House, Marlbro', Wilts.
†Stracey, Henry J.	. .	The Hall, Kirby-Bedon, Norwich
Strafford, Henry	7, Brecknock-cres.	Babraham, Cambridgeshire
Stratton J. Locke	. .	Farthinghoe Lodge, Brackley, Northam.
Stratton, James	. .	Manningford, Bruce Pewsey, Wilts.

Members.	Town Residence.	Country Residence.
Stratton, William	. .	Upavon, Pewsey, Wilts.
Strickland, Walter	. .	Cokethorpe Park, Witney, Oxon.
†Stringer, Miles	. .	Effingham Hill, Leatherhead, Surrey
Strong, W.	. .	Hardingstone, Northampton
Stronge, Thomas	. .	Cirencester, Gloucestershire
Stroud, Henry V.	. .	Spetisbury, nr Blandford, Dorset.
Sturkey, T. O.	. .	Highgate, Newtown, Montgomeryshire
†Sturt, Henry Charles, M.P. .	16, Portman-sq. .	Critchill Woodyates, Dorsetshire
Sumner, Rev. C. V. Holme .	Union Club .	Byfleet Rectory, Cobham, Surrey
Sumner, William Holme . .	Union Club .	Hatchland Park, Guildford, Surrey
Sutherland, John William .	. .	Croydon, Surrey
Swaffield, Samuel	. .	Ampthill Park, Bedfordshire
Swainson, Rev. Chas. Litchfield	. .	Crick, Northamptonshire
Swan, J. William	. .	Hockham, near Larlingford, Norfolk
Swann, James	. .	Ensham, near Oxford
Swavesay, John Francis . .	. .	Cambridge
Tabor, Charles	. .	Bocking, Essex
Tanner, William	. .	Patcham, nr Brighton, Sussex
Tatchell, John Tatchell . .	. .	Stoke-sub-Hamdon, Somersetshire
Tatham, T. D. Fearon		
Tattershall, John	46, Lw Belgrave-pl	
Tattershall, Richard . . .	Hyde Park Corner	
Taunton, William Pyle . .	. .	Bristol, Somersetshire
†Tawney, Charles	. .	Oxford
†Tawney, Henry	. .	Banbury, Oxfordshire
Taylor, Isaac	. .	Shrewsbury, Salop.
Taylor, John	. .	Bolas, Wellington, Salop.
Taylor, Thomas	. .	Church Hill, nr. Chipping-Norton, Oxon.
Taylor, Thomas	. .	Bolas Villa, Wellington, Salop.
Taylor, Thomas Lombe . .	. .	Starston, Harleston, Suffolk
Taylor, Sir Charles, Bart. . .	. .	Holly Combe Lodge, Liphook, Hants.
Taylor, Walter	. .	Hockley, nr Alresford, Hants.
Templeman, John	. .	Crewkerne, Somersetshire
Thackrah, George	. .	Feltham, Middlesex
Thackwell, John Cam . .	. .	Ledbury, Herefordshire
Theobald, George	. .	Starston, near Harleston, Norfolk
Thimbleby, William . . .	. .	East Kirby, nr. Bolingbroke, Lincolnsh.
Thomas, James	. .	Lidlington, nr Woburn, Bedfordshire
Thomas, Rev. V.	. .	Oxford University
Thompson, James	. .	Lainbrigg, Kendal, Westmoreland
Thompson, Rev. George . .	. .	Abbott's Ann, near Andover, Hants.
Thompson, Henry Stephen .	. .	Kirby Hall, Green Hamerton, Yorkshire
Thompson, R. T.	. .	Kirby Hall, Green Hamerton, Yorkshire
Thompson, William C. . .	. .	Abingdon, Berks.
Thomson, Guy	. .	Oxford
†Thomson, Rt. Hon. C. Poulett,	. .	Canada
Thornhill, George, M.P. . .	17, Low. Grosvr.-st.	Diddington, Buckden, Hunts.
Thornhill, George, jun. . .	17, Low. Grosvr.-st.	Diddington, Buckden, Hunts.
Thornton, Stephen	. .	Moggerhanger House, Biggleswade, Beds
Thorold, B. H..	. .	Harmonston Hall, near Lincoln
Thoyts, M. G.	. .	Sulhamstead House, near Reading, Berks.
Threlfall, Lazarus . . .	. .	Lancaster
†Throckmorton, R. G. . . .	. .	Buckland, nr Faringdon, Berks.
Thurnall, Henry	. .	Royston, Cambridgeshire
Thurston, Capt. C. T., R. N. .	. .	Machynllaeth, Montgomeryshire
Tilden, John	. .	Ifield Court, Gravesend, Kent
Tillard, Philip	. .	Alwalton, Huntingdonshire
Tillyer, George	. .	Feltham, Middlesex

Members.	Town Residence.	Country Residence.
Tillyer, George, jun.	. .	Feltham, Middlesex
Tillyer, James	. .	Harmondsworth, Middlesex
Tillyer, James, jun.	. .	Harmondsworth, Middlesex
Tillyer, R. B. jun.	. .	Harmondsworth, Middlesex
Tindale, Benjamin	. .	Ewerby, near Sleaford, Lincolnshire
Tindale, Thomas	. .	Sleaford, Lincolnshire
Tinling, Charles	. .	Worthing, Sussex
Toker, Richard Edward	. .	Kenfield House, Canterbury, Kent
Tollet, George	. .	Betney Hall, near Newcastle, Staffrdsh.
Tomkinson, Rev. James	. .	Dorfolk, Nantwich, Cheshire
Tompson, Charles Kett	. .	Witchingham Hall, Norwich, Norfolk
Tongue, Charles	. .	Braunceston, near Lincoln
Tongue, William	. .	Comberford, near Tamworth, Staffs.
Tooke, William, F.R.S.	12, Russell-square	
Toovey, Henry	. .	Hambleden, Henley-on-Thames, Oxon.
Toovey, Thomas	. .	Joyce Grove, Henley-on-Thames, Oxon.
Toovey, William	. .	Crowmarsh, Wallingford, Berks.
Toovey, William	. .	Newnham, Wallingford, Berks.
†Torkington, James	. .	Stukely, Huntingdon.
†Torr, William, Jun.	. .	Riby, nr Caistor, Lincolnshire
Torr, Edward	. .	Kingsbridge, Devon.
Tovey, Henry	. .	Stanton, Highworth, Wilts.
Towers, John	. .	Pinkney's Green, nr Maidenhead, Berks.
Townsend, John	. .	Oxford
Toynber, George	. .	Hickington, Sleaford, Lincolnshire
Treby, Henry Hele	. .	Cobham Lodge, Cobham, Surrey
Tremenheere, H. Pendarves	. .	Penzance, Cornwall
Trenchard, Rev. J.	. .	Staunton House, Highworth, Wilts.
Trevor, Hon. General	. .	Glynde, nr Lewes, Sussex
Treweeke, Rev. G.	. .	Illogan, Cornwall
Tredgold, Henry	. .	East India College, Haileybury, Herts.
Trinder, William	. .	Wantage, Berks.
Trinder, Daniel	. .	Cirencester, Gloucestershire
Trotter, John	. .	Staindrop, Durham
Trower, Henry S.	. .	Castle Thorpe, nr Stony Stratford, Bucks.
Trumper, William	. .	Iver, Colnbrook, Buckinghamshire
Trumper, James	. .	Southall, Middlesex
Trumper, Edward	. .	Nuneham Park, nr Oxford
Trumper, Robert	. .	Wyke Farm, Isleworth, Surrey
Tuckey, Thomas	. .	Compton-Beauchamp, Faringdon, Berks
Tuckwell, Humphry	. .	Signet, nr Burford, Oxon.
†Tudway, C.	. .	Wells, Somersetshire
Tull, Edward	. .	Peasemore, Newbury, Berkshire
Tull, Richard	. .	Crookham, Newbury, Berkshire
Turner, George	. .	Barton Alphinton, nr Exeter, Devon.
Turner, William	. .	Shipton, nr Woodstock, Oxon.
Turner, Vincent John	. .	Shipton, nr Woodstock, Oxon.
†Turner, Chas. Hampden, FRS.	15, Bruton Street	Rooksnest, Godstone, Surrey
Turner, James	. .	Oxford
Turner, James Singer	. .	Shoreham, Sussex
Turney, W.	. .	
†Turnor, Christopher	. .	Stoke, Grantham, Lincolnshire
Twynam, J. T.	. .	Whitchurch, Hants.
Twynam, Thomas	. .	Bishopstoke, nr Winchester, Hants.
Twynham, Dr.	. .	Lainston House, nr Winchester, Hants.
Tylden, Lieut.-col. Sir J., F.R.S.	. .	Milsted, Sittingbourne, Kent
Umbers, Samuel	. .	Dunton Hall, Coleshill, Warw.
Umbers, Thomas	. .	Wappenbury, Warwickshire

Members.	Town Residence.	Country Residence.
Umbers, William	. .	Weston Hall, nr Leamington, Warw.
Umbers, William, jun. . .	. .	Wappenbury, Warwickshire
Unwin, Stephen, jun. . . .	. .	Coggeshall, Essex
Upperton, Edward Fuller . .	. .	Thakeham, near Storrington, Sussex
Uppleby, L.	. .	Wooton Hall, Lincolnshire
Uppleby, William	. .	Bonby, Barton, Lincolnshire
Upton, Edward.	. .	Wroxeter, Shrewsbury, Salop.
Upton, Henry	. .	Aldwick, Bognor, Chichester, Sussex
Vaisey, Thomas	. .	Stratton, nr Cirencester, Gloucestershire
Vaizey, George	. .	Halstead, Essex
Vallance, James	. .	Hurstperpoint, Brighton, Sussex
Vanderstegen, W. H.	. .	Cane End House, Caversham, Oxon.
†Vane, Rev. J.	. .	Dulwich, Surrey
Vaughan, James	. .	Osney Mill, Oxford
Vaughan, Rev. T.	. .	Llandwailog, Brecon
Veasey, Charles	. .	Huntingdon
Veasey, David	. .	Castle Hill House, Huntingdon
Veasey, James	. .	Godmanchester, Hunts.
Venables, Charles	. .	Woburn, Beaconsfield, Bucks.
Vere, Gen. Sir C. Broke, bt. M.P.	4, Mid-Scot. Yard	Broke Hall, Nacton, Ipswich, Suffolk
†Verney, Sir Harry, Bt., M.P.	. .	Claydon House, Winslow, Bucks.
Vernon, Granville H., M.P. .	5, Mansfield-street	The Grove, East Retford, Notts.
Vevers, William	. .	Donnington Court, Herefordshire
Villiers, Lord	38, Berkeley-sq.	
Viall, King	. .	Stoke, Clare, Suffolk
Viall, S.	. .	Foxearth, near Sudbury, Suffolk
Vines, Richard	13, Grt. College-st. Camden Town	
Waddington, H. Spencer, M.P.	. .	Cavenham, Suffolk
Waite, John Utting	. .	Sibsey, nr Boston, Lincolnshire
Wake, Sir William, Bart. . .	. .	Courteen Hall, Northampton
Wakefield, John	. .	Sedgwick House, Kendal, Westmoreland
Wakely, William	. .	Rainham, Rochester, Kent
Walesby, Prime	. .	Rauceby, nr Horncastle, Lincolnshire
Walker, George	. .	Greenfield Lodge, Strixton, Northamp.
Walker, James.	. .	Northleach, Gloucestershire
Walker, John	. .	Barton, nr Worcester
Walker, Rev. Henry	. .	Heathfield House, nr Oxford
Walker, Thomas	. .	Danes Hill, East Retford, Notts.
Wallace, W. T.	. .	Shifford, nr Witney, Oxon.
Wallis, Owen	. .	Overstone, near Northampton
Waller, H. S.	. .	Farmington, Northleach, Gloucestersh.
Waller, Rev. R.	.	Bourton, Northleach, Gloucestershire
Wallington, James.	. .	Charlecote, nr Warwick
Walpole, William	20, Upp. Belgr. Pl.	
Walsh, Sir John B., Bt., M.P.	28, Berkeley-square	Warfield, Bracknell, Berks.
Walsh, Henry	. .	Oxford
Walsh, John	. .	Oxford
Walter, John	. .	Borden, Sittingbourne, Kent
Walter, William	. .	Gore House, Upchurch, Kent
Walters, James W.	. .	Barnwood, near Gloucester
Warburton, Hen., M.P., F.R.S.	45, Cadogan-place	
Ward, Henry George, M.P. .	34, St. James's-pl.	Gilston Park, Harlow, Essex
Warner, Richard	. .	Shillington, Blandford, Dorset.
Warner, William Mead . .	. .	Thomley, near Thame, Oxon.
Warre, J. Ashley, M.P., F.R.S.	7, Belgrave-square.	
Warren, H.	. .	Isleworth, Middlesex

Members.	Town Residence.	Country Residence.
Warren, Richard		Shillingston, Blandford, Dorset.
Warrender, Sir G. Bart. F.R.S.		Clifden House, Maidenhead, Berks.
Warrington, L.		Witney, Oxon.
Warriner, G.		Bloxham Grove, near Banbury, Oxon.
Warry, George		Shapwick, Glastonbury, Somerset.
Warsop, J.		Alconbury Hill, Hunts.
Warwick, W. Atkinson		Cambridge
Wasey, C.		Prior's Court, near Newbury, Berks.
Wasey, John F.		Prior's Court, near Newbury, Berks.
Washbourne, E. B.		Speenhamland, Newbury, Berks.
Washbourne, T. E.		Speenhamland, Newbury, Berks.
Waters, Thomas		Stratford Sub-Castle, Salisbury, Wilts.
Waters, Thomas Robert		Holcott, Northamptonshire
Watford, Alexander		Cambridge
Watkins, Lloyd		Pennoyre, near Brecon, S. W.
†Watkins, William		Ombersley, Worcestershire
Watson, Captain		Borde Hill, Cuckfield, Sussex
Watson, Henry		Walkeringham, near Bawtry, Notts.
†Watson, James		Thorney, near Peterborough, Northamp.
Wayman, C.		Troxton, Bury St. Edmund's
Weall, Thomas		Woodcote Lodge, Beddington, Surrey
Webb, Charles		Oxford
Webb, Daniel Cogg		Kiddington, Woodstock, Oxon.
Webb, Edward		Adwell House, near Tetsworth, Oxon.
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DIRECTIONS TO THE BINDER.

The Volume will consist of two Parts: namely, of the *Articles* and the *Appendix Matter*, the whole of each class being brought together in the order of the paging. In the new edition of Part I., however, pages xxi to xlvi were not reprinted.

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ERRATUM.

Mr. Greaves's foot-note, page 296, was accidentally misplaced, and belongs to the end of the first paragraph in page 303, relating to the treatment of "blindness."